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Agriculture.

CASTOR OIL BEAN.

Mr. H. Ross, Chief Inspector of Agriculture, New South Wales, writes on the advantages and disadvantages of the cultivation of the Castor plant as a commercial proposition as follows:—

IS CASTOR BEAN PRODUCTION PAYABLE?

To answer this question it has to be borne in mind that countries in which cheap labour is available are the principal producers; therefore, the question of exporting our surplus crop is one which cannot be regarded seriously, and to satisfy the local demand must be the one aim of the would-be producer.

The following questions naturally present themselves:—

1. What is the demand for castor beans?
2. How many bushels per acre is a fair yield?
3. What is the probable price per bushel?
4. What is the cost of production, including rent of land, seed cultivation, harvesting, and marketing?

The answers are:—

1. The demand is a limited one; assuming 100,000 gallons to be sufficient for New South Wales requirements, about 3,500 acres under this crop will supply this demand.
2. Not more than 20 bushels per acre can be expected, although yields of 30 and even 40 bushels per acre are recorded from Florida, South Carolina, Georgia, Texas, and California.

The Queensland Department of Agriculture, in the July issue of the "Queensland Agricultural Journal," states that the average yield is about 20 bushels per acre.

3. The price per bushel can hardly be estimated, in so far that no market has been established in the past for beans in Australia.

The War Department of Washington, U.S.A., has let contracts for the supply of beans at 3.50 dollars (approximately 14s.) per bushel of 46 lb. This, it must be remembered, is during War time, when an unprecedented demand has set in for castor oil for aeroplanes, and it is not likely that these prices can be maintained.

Quoting from an article in the "Country Gentleman" (U.S.A.) for March, 1918, contributed by E. B. Reid, it is stated that "in recent times prices to farmers have fluctuated widely by localities and years, ranging from 1 to 2 dollars a bushel, with possibly 1 dollar to 1¼ dollar about the average."

Further evidence is available as to price in an article on castor seed published in the "Bulletin of the Imperial Institute," 1911. The writer states that specimens were submitted to commercial experts, who valued them as follows:—

	£	s.	d.		
Nos. 1, 3, 4, 6	9	17	6	per ton,	March, 1909.
„ 5, 7	9	10	0	„	„ „
„ 2	9	0	0	„	„ „
„ 8	8	10	0	„	„ „
„ 9	13	5	0	„	October, 1910.

net weight, including bags, delivered free ex ship "Hull," less 2½ per cent. discount.

Taking the American and English figures as a guide, we see then that the price in 1909 was somewhere about 4s., and in 1910 in the vicinity of 5s. 4d. per bushel.

4. The cost of production can only be arrived at according to locality; it would be somewhat similar to the cost of producing an acre of maize except that the harvesting is much more expensive. This is accounted for by the fact that the pods do not ripen evenly and the crop has to be gone over several times in order to harvest it. An estimate for producing, harvesting, bagging, and marketing a 20-bushel crop of castor beans, allowing 10s. per annum for rent, would not be less than £5 per acre.

From the above figures, farmers will be able to draw their own conclusion as to whether this crop can be considered payable. Furthermore, it may be stated that castor oil plants cannot be grown continuously on the same land for any lengthy period, because the crop exhausts the soil rapidly; so much so that some authorities state that it should be grown only once in five or six years on the same land.

In India the castor bean is usually not grown as a pure crop—that is, it is not grown by itself, but is grown as a border to either a cotton or some other crop, being frequently mixed with a cereal or a legume crop.

The castor oil plant has been proclaimed a noxious weed in many shires and municipalities of this State, and before it can be cultivated in these districts, the restriction would have to be removed.

METHODS OF CULTIVATION.

For the benefit of farmers who wish to try this crop the following information regarding cultivation, harvesting, &c., is given:—

Climate.—A tropical or sub-tropical climate is best suited for the production of castor beans, the North Coast being particularly suitable.

Soil.—A good loamy soil such as is suited for maize-growing is best, although fair results may be obtained from poorer soils. Heavy clay soils, especially those which are wet and sour, are unsuitable.

Sowing.—The seed should be sown in spring when all danger of frost is over, on well prepared land, in hills, 6 or 7 ft. apart in the rows, and from 6 to 8 ft. apart between the rows. Three seeds are planted in each hill and covered to a depth of 2 to 3 in. It is advisable to pour hot (not boiling) water over the seed prior to planting and let them steep for twenty-four hours.

Thinning out.—When the plants are from 6 to 8 in. high the two smaller ones should be removed from each hill, leaving the strongest.

Intertillage.—It is necessary to cultivate between the rows in order to keep down all weed growth. The intertillage should be similar to that given to a maize crop.

Pinching back.—If the plants are allowed to grow without check they will frequently attain a height of from 15 to 20 ft., thus making the harvesting of the seed very inconvenient. In order to keep the plants at a convenient height, the main stem should be pinched back.

Experiments are being conducted on the Grafton and Wollongbar Experiment Farms, also in several localities on the North Coast; and until the results from these experiments are to hand, farmers who wish to give this crop a trial are advised to do so only on a very small scale.

PERCENTAGE OF OIL.

The "Bulletin of the Imperial Institute" (1911) gives the result of nine samples submitted for examination:—

No. of Sample.	Yield of Oil.	No. of Sample.	Yield of Oil.
	Per cent.		Per cent.
1	48·0	6	48·9
2	50·8	7	47·6
3	49·4	8	45·8
4	47·8	9	48·2
5	50·0		

A sample obtained from Queensland was analysed by the Chemist's Branch of this Department, and Mr. Guthrie reports as follows:—

Husk	24.63 per cent.
Kernel	75.37 „

The yield of oil from the kernel was 55.41 per cent. corresponding to a yield of 41.76 per cent. of the whole bean.

The oil was obtained by extraction with sulphuric acid.

HARVESTING SEED.

It is here where most of the difficulties in connection with this crop will be encountered. The seed does not all ripen at the same time. When nearly ripe the capsules begin to turn brown, and it is then that the "spikes" should be harvested. If left, seed shoots out of the capsule. The spikes ripen at irregular intervals, necessitating going over the crop several times before the seed is harvested. Cutting the spikes has to be done by hand; immediately they are cut they should be carted to the barn and spread out, preferably on a wooden or a hardset earthen floor, surrounded by sides about 2 feet high; these sides may consist of either wood or bagging. The hot rays of the sun will greatly accelerate thorough ripening. They will need to be turned over with a fork at least once a day until thoroughly ripe, when the seeds will "pop" out. It is this popping of the seeds which necessitates the cut spikes being placed either in a shed or on a floor surrounded by an enclosure.

After the seeds are out of the capsules nothing further remains to be done except to separate the seeds from the husks by winnowing.

It usually takes from four to six days after cutting before the spikes shed their seed.—"Agricultural Gazette" of New South Wales, December, 1918.

COTTON-GROWING AT ESK.

Esk is a thriving agricultural and dairying district, 67 miles by rail from Brisbane. We have received from Mr. W. S. Harding, Inspector of Dairies in that district, the following information concerning the cultivation of cotton there. In the issue of this "Journal" for April last, we published a valuable and interesting paper by Mr. D. Jones, Instructor in Cotton-growing, on the Cotton Industry in Queensland, in which he mentioned the success achieved by Mr. Litzow in the Lowood district (45 miles from Brisbane). This farmer had about an acre of cotton which last year suffered severely from drought, but yet yielded 1,700 lb. of seed cotton. Had the slightest rain fallen during the growing season, the crop would have been very much larger; but, notwithstanding the drought, he obtained £50 for the two crops which he sent to the State Ginnery at the Department of Agriculture, equal to £25 per acre. We are much indebted to Mr. Harding for the following information as to the result of a small plot of 2¼ acres of cotton grown by Mr. Otto Mollenhauer, of Coal Creek, Esk, from seed supplied by the Department of Agriculture. From this plot, 3,406 lb. of raw cotton was gathered, for which he received from the Department £57 5s. 4d., or an average of £25 9s. per acre. This cotton was grown during the late drought, having had scarcely any rain from the time it was planted until picking was commenced. The plot where the crop was grown was on the eastern slope of a very high ridge, the soil being of a gravelly nature, with a clayey subsoil. The bushes were not cut down by the frosts of last winter, but sprouted out again in the spring. As they started to pod early, picking was again started about Christmas, and Mr. Mollenhauer estimates that he will receive as much from this plot as he did for that of last season. He has planted another plot of about 2½ to 3 acres this season, which is doing equally well, if not better.

STACKING GREEN OR WET LUCERNE.

The Director of Agriculture, referring to the statement in the "Producers' Review," that thousands of tons of lucerne were wasted last year during the wet season, states that similar conditions have been noted in Queensland on too many occasions during "years of plenty," which have been, unfortunately, characterised by a prodigal waste of material, unprecedented, perhaps, in any other country in the world.

Farmers can have every confidence in erecting stacks of green succulent lucerne and even in stacking the fodder when wet. A little more than twelve months ago a number of references were made in the Press by the Department *re* conserving lucerne in this way, and officers were sent out to give advice to farmers on methods of stacking. It may be of interest to note that a quantity of lucerne was stacked last year at the Warren State Farm in the Rockhampton District immediately after the floods (the weather being too humid and wet to make hay), and the resultant ensilage (which gave a relatively small percentage of waste) proved invaluable in the winter for the dairy cattle. The fodder was stacked in a framework of poles which were sunk in the ground and bound securely with top plates twitched on to the uprights so as to induce an even settling of the mass, this latter being facilitated by weighting the top with a thick covering of soil heaped up in the centre to turn off the rain.

Work of this character is of course hampered in wet weather where soils are of a sticky nature, but the old adage—"Where there's a will there's a way"—briefly sums up a situation where a little more effort at the right time on the part of the individual would go a long way towards solving a problem of vital moment to our rural community.

This Department is only too ready to give practical advice on the subject through the instructional staff when communicated with by individual farmers.

FLAX-GROWING.

We have received from Mr. H. A. Strain, of Terror's Creek, the following paper on the flax industry. The author has had a life-long experience in all branches of the business, from the field to the factory, in Ireland, and is a strong advocate of the vigorous prosecution of flax-growing in Queensland:—

"According to promise, I will explain in my own way what I know about flax growing and manufacturing up to a certain stage; and I will make it as plain and simple as possible, so that Ulster men in Australia will understand it and try to back up the promoters of one of the greatest industries ever started in Australia.

"In this article I do not propose to say anything concerning the manufacture of flaxen goods. I shall treat of that later on. As regards the cultivation of the plant, the first problem is to ascertain the proper time for saving the seed, which is produced about four months after sowing. Seeing that two crops of potatoes are obtained annually in Queensland, there is no reason why we should not harvest two crops of flax. For the summer crops, July is the most favourable month for sowing, as it will be three months before weeds can do any harm to the plants. Heavy crops of flax can be grown on river and creek flats, in spite of weeds; and experience has shown that it will not pay to have the weeds pulled out by hand.

"In Ulster the farmer has his own family to clean the crop, and it would never pay to give 10s. or 12s. per day to 'slow-go' men for flax-weeding. If the industry is to go ahead in Queensland, it must be on a very large scale; and hand-weeding would be a waste of time and money. But we have millions of acres of new lands as good as any in the world, not far from the coast, where the plant will thrive better than farther inland. I think that the Burnett District would be the premier flax area in Queensland, if not in Australia. Heavy land is not so suitable as lighter soils.

"The second problem we are concerned with is what may be called 'the winter crop.' I am not so sure of the success of this crop; the only chance for it would be to sow the seed no later than from the middle of February to the middle of March. This would secure fully three months' growth, and longer in some cases. When the flower has dropped off I do not consider that frost would do any harm, as the plant has then about done growing. It would scarcely be wise to sow the winter crop in old ground, as it would be the wrong time of year to enable it to get a start on account of weeds. Of course it would be quite a different matter in the case of new ground.

"My neighbour, Mr. Riley, and I intend to solve these problems during the next two seasons. I think it would be encouraging to pioneers of the industry if the Government were to offer a prize for the best sample of flax for linen manufacture at the next Exhibition of the National Association; and I consider it is the bounden duty of every man on the land and in the fibre trade in Australia to assist in every possible way to make flax-growing a success. Few people in Australia have any idea of the vast number of people who would find employment in various ways in connection with successful flax-growing—from the sowing of the seed, and through the various stages of the product, until the web of linen reaches the drapers' shops.

"It is not necessary here to dilate upon the manufacturing processes. Our first work is to prove that we can grow this crop to a profit, and the next to consider the water question; and the latter is a very serious consideration, for, even if we could grow the best flax in the world, we could not produce a readily marketable article unless we had the right class of water, and that is soft stagnant water; otherwise all the work of the grower goes for nothing. The waterhole must be firm, and hold water like a bucket; for, should it soak away whilst the flax is undergoing 'retting,' all is lost labour.

"Taking it all round, I consider that Samson Vale offers the best conditions as regards water. Some growers might have to cart their crop from some distance to the water; but it will well repay them, as in many cases they will realise double the price for their flax. There is a marked difference between flax that the rope-maker buys and a flax for linen web which would require the aid of a strong magnifying glass to count how many hundred threads are contained in one inch of it. There are many places where the needful class of water is plentiful, and others where it is difficult to find it.

"Many industries—such at wheat-growing, fruit culture, dairying, cotton-growing, &c.—are assisted by the Department of Agriculture appointing experts in these industries to point out lands suitable for the various crops, giving demonstrations on the farmers' own lands and on experimental farms to enable men to make a success, when, without this help, they might be working at a loss. A man might be engaged to show intending flax-growers how to proceed at each stage of the crop. It would also be advantageous if each man who sows a plot of flax would take the trouble to make notes of the class of ground sown, the date of sowing, the rainfall from seed-time to harvest, &c., &c., and also obtain an analysis of the soil, which would, later on, be of great value to him. The worst trouble of the agriculturist is the high cost of labour. I am not so much afraid of good wages to good workers as I am of the 'go-slow' variety of field workers, and of strikes.

"As soon as the flax is ready for pulling, it must be pulled and watered as soon as possible, or the fibre will lose a great part of the oil in it, and then, when it is 'scutched,' it will be quite hairy and not fit for fine work. If pulling and watering are not done quickly, a farmer would lose from 2s. to 4s. a stone, and that would amount to a considerable sum on 50 acres of flax. Thus it is easy to imagine what a loss it would be to growers if a general strike were declared just at harvest time. I would, of course, like to see every man getting good, fair wages, so that he could keep his wife and family and himself in comfort and get out on a Sunday, decently clothed, to their place of worship.

"There is a district in Ulster (Ireland) mainly red soil, and there is no better in Ireland for heavy crops and good quality of flax. We have thousands of acres of the same class of soil here on our eastern watershed which would grow good flax sheltered from the westerly wind. There it could be sown early and late. There is a splendid rainfall. It would be well to try a plot or two on Mount Mee, and this would not need a large outlay to find out whether flax would prove a success there or not. It is time to get a move on for the July sowing. Then we shall have breathing time before next March, when we can try the autumn crop. Mr. Riley and I have been trying some seed we got. There is no time to send to Holland for July sowing, but this first lot will give us a little experience. If we are successful, the farmers in a few years would not have to import seed.*

"It would take too long at present to explain the method of treating the crop without injury to the fibre, but I will deal with that later on."

WATERPROOFING CALICO.

The "Farmers' Advocate," South Africa, says that a cheap and effective cover can be made by dipping a piece of unbleached calico, or canvas duck, into paraffin, and while it is wet with the paraffin, painting it with any colour preferred, then leaving it to dry. This cover will not harden or stick together as the ordinary tarpaulin will.

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* The Department of Agriculture has not been unmindful of the flax industry. Flax seed has been distributed to many farmers with instructions for sowing and harvesting the crop.—Ed. "Q. A. J."

NITRATE OF SODA SUPPLIES.

A newly constituted body styled the Associated Producers of Chilean Nitrate is now officially selling nitrate of soda at a definitely fixed price delivered alongside ship at Chilean ports.

The price fixed is considerably below that which was ruling during the last year of hostilities, but the landed price here will still depend largely on the freight rate in bringing forward cargoes.

It is understood that negotiations are now proceeding which should assure the arrival in Australia of ample stocks of nitrate of soda in the spring, and although the price is still likely to be considerably higher than in pre-war times as the result of increased cost of production in Chile, as well as of higher freights, still it should be purchasable at an appreciable reduction on that now ruling.—"Agricultural Gazette of New South Wales."

It is now well known throughout the sugar-growing centres of the world that nitrogenous manures are of outstanding importance in the fertilisation of sugar-cane.

Pastoral.

NEW WOOLLEN COMPANY.

Since the closing down of the Queensland Woollen Manufacturing Company at Ipswich some years ago, Queensland has been dependent on the woollen mills of the Southern States, and to a very large extent on Germany and other countries, for its supplies of woollen goods, yet it is stated that every woollen mill in Australia is a financial success. Had the cotton mill which operated at Ipswich successfully, when cotton-growing appeared to be one of the staple agricultural industries of the State at the time of the Civil War in America, been able to compete with mills in Europe, doubtless the industry would have flourished, and more mills would have been established. Under present conditions of cotton-growing, aided as it is by the Government, there may yet be a flourishing cotton mill established in Southern Queensland.

The prospectus of the Victory Worsted and Woollen Manufacturing Company, Limited, has now been issued under the provisional directorship of Messrs. J. K. Stewart, Daniel Mactaggart, J. H. Hart, George Coxon, F. E. Sturmfels, and Franklin Robinson. The objects of the company are to establish in the vicinity of Brisbane up-to-date worsted and woollen mills for the manufacture of serges, ladies' dress materials, and tweeds, for which there is practically an unlimited market, and to extend its manufactures according to the requirements of its customers. As the Australian woollen companies enjoy a protective import duty and landing charges of over 40 per cent., it will be conceded that the prospects of success for the new company are bright.

Mr. F. Robinson, who has joined the provisional directorate as manager, was manager of the Queensland Woollen Manufactory at Ipswich abovementioned. He is also a member of the State Wool Committee.

ONIONS FOR NERVES.

In a publication entitled "What to Eat," issued somewhere in England in 1903, the following eulogy of the onion appeared:—

"There is nothing, medicinally speaking, so useful in cases of nervous prostration as the poor, humble onion. They are almost the best nervine known, and may be used in coughs, colds, and influenza, in consumption, scurvy, and kindred diseases. White onions overcome sleeplessness, while red ones are an excellent diuretic. Eaten every day, they soon have a whitening effect upon the complexion.

The Horse.

MORE ABOUT THE SUFFOLK PUNCH.

Last month we gave our readers a New Zealander's opinion of the Percheron, of which Norman breed the Suffolk Punch is supposed to be a descendant, but the precise origin of the Suffolk is, like that of most ancient breeds, enshrouded in obscurity; but, at the same time, the antiquity of this horse is absolutely beyond all question. So far back as the year 1720 allusions to the breed in the Suffolk "Ipswich Journal" are so frequent as to render it certain that it was firmly established at that period. Indeed, it is asserted by some that the Suffolks were cultivated as a distinct breed 500 years ago by crossing the old Norman horse with East Anglia mares. Be this as it may, the fact remains that the Suffolks of the present day can boast of pedigrees that extend back as far as 1768, at which period there existed a notable but nameless stallion belonging to one Crisp, a resident of Ufford, near Woodbridge.

In 1908, this breed was introduced for farm purposes by the Department of Agriculture and Stock in Queensland, the first lot having been obtained from Mount Abundance.

Whether the Suffolk Punch will ever reach the position of the most favoured heavy horse is, perhaps, a matter of considerable doubt, but to those who require for their work a fast, active, good-tempered, and good-constitutioned draught horse, there is no gainsaying the fact that they might do far worse for themselves than by giving a chance to the handsome and long-lived Suffolk Punch, whose antiquity alone may commend him to their consideration.

Even as a heavy saddle horse the Suffolk is a treasure. The writer bought a beautiful, nuggety, silver-maned chestnut Suffolk from Mr. White, of Bluff Downs, North Queensland, in 1875. A more powerful, docile horse for a traveller could not be imagined. Fast, he was not; but for endurance he could not be surpassed. The proof of this may be shown that, on one occasion, the writer left the late Mr. William Hann's station at Maryvale (N.Q.) at 6 a.m. to make a station only 40 miles distant. Mr. Hann gave directions for a short cut through the bush; but, as it turned out, "the longest way round would have been the shortest way home," for, after carefully following directions, nightfall found the traveller in a piece of waterless broken country, and during the whole day no water had been found. After a fruitless endeavour to track the footsteps of a shod horse on the bank of a dry gully, it was decided to leave the matter to the horse. He set off at a quick walk, which he never relaxed till 4 a.m. the next morning, when he brought up at the first water on Tara Station, and then trotted gaily on to Maryvale, a journey of nearly 80 miles. At 8 a.m. he started again, this time in company with the mailman, and reached his destination at 6 p.m., making a journey of 120 miles with only a spell of about two hours, and he was as fresh as a daisy on arrival. Next day he was ridden 30 miles to the Etheridge, *viâ* Gilberton, and returned to Townsville, after three days' spell at Georgetown, as lively and in as good condition and temper as if he had only had a day's outing. That horse cost £25, and he was worth £50. Now, here is an account of this breed of horses which must convince anyone that the Suffolk Punch is the horse, *par excellence*, for the farmer, taken from a paper by Mr. A. Jaques,* of Lamerton, Alberta, Manitoba:—

Perhaps, in the eyes of the ordinary visitor to an agricultural show, there is no variety of the so-called heavy horse more attractive than the Suffolk. The breed, moreover, comes as somewhat of a novelty to many persons, for, in spite of the great claims possessed by the Suffolk upon the suffrages of the agriculturist and the townsman, it is still in East Anglia that his merits are most keenly appreciated, and, in fact, the farmers in that part of the country prefer the Suffolk to any other breed of heavy horse.

It is still, however, against the breed that the proportions of a Suffolk do not equal those of a Clydesdale or a Shire horse, many persons being thereby led away into a belief that the east country animals are proportionately weaker than the others; whereas those who are best acquainted with their merits entertain the opinion that,

* Mr. Jaques was a breeder and importer of these horses, and in the past imported direct from England 17 Suffolk Punch horses and 36 Suffolk sheep.

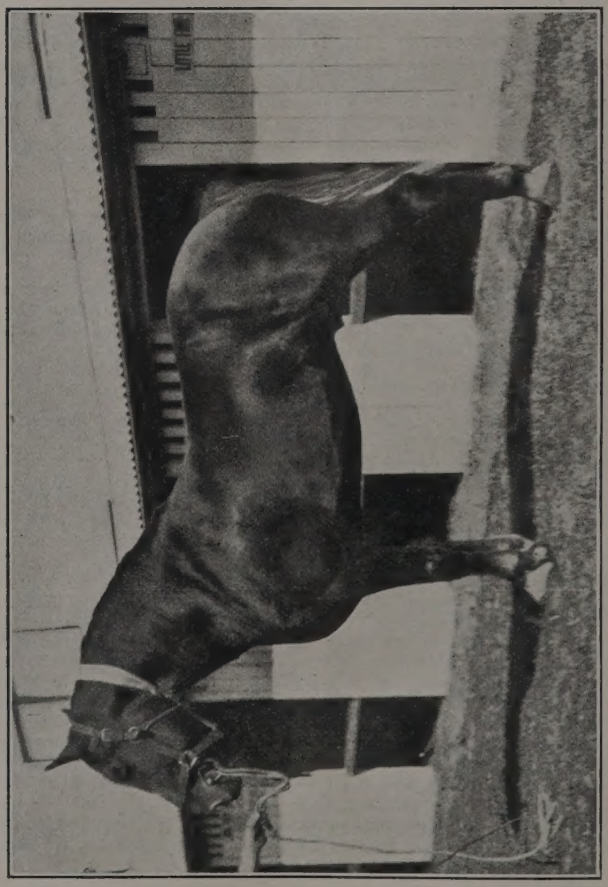

PLATE 1.—CHAMPION SUFFOLK PUNCH STALLION, "GLENTHORNE MONARCH."

considering his height—16 hands 1 in. is the recognised limit of stature in connection with this breed—the Suffolk is quite as powerful an animal as any other breed of horse in existence.

Probably, therefore, if he were better known in Western Canada, the Suffolk would considerably increase the circle of his supporters; but, in the face of the patronage that is now being extended to both Clydesdales and Shires, the development of the Punch will be for a time retarded. Nevertheless, he is holding his ground in many other countries, and is being largely sought after by the Germans, Austrians, and Russians, to be used in their Government studs for the purpose of crossing and getting artillery horses. No doubt this horse has not the weight or power to draw through crowded streets heavy lorries and other such cumbersome vehicles when loaded to their utmost. Such duties lie far more within the province of the Clydesdale or the Shire; but, in front of a plough, with a good man behind it, a pair of Suffolks can get through a day's work that should amply satisfy the requirements of any reasonably-minded agriculturist. Then, too, for the lighter class of goods traffic in towns, the Suffolk is a very suitable horse; he is so much more active than the Clyde or Shire, in addition to being faster than either, that he can get through a day's work in a comparatively light wagon far better than they.

Of course, no colour of coat other than chestnut is admissible in an animal that is desired to enter for the Suffolk Stud Book Association, it being distinctly laid down that, though the shade may vary, there is no place for any horse save chestnuts in the society's official volume.

In addition to colour, the Suffolk is distinguished from the Clydesdale and the Shire horse by the fact that he is a clean-legged animal, and does not possess the extreme amount of feather that is so much sought after by breeders of these varieties. This circumstance may very possibly be accepted as an additional reason for the slowness which has characterised the headway made by the Suffolk in Canada, for it seems that the majority of agriculturists in this country are great advocates of hair and bone, and a general belief prevails that if hair is absent on a heavy horse's legs bone is certain to be deficient likewise. This, however, is not generally accepted by the breeders of Suffolks, who support their contentions by measurements, and assert that their favourite horse—that is, when his height at shoulder and general bulk are taken into consideration—is fully the equal of his heavier rivals as regards the amount of bone he possesses below the knee. As a case in point, Mr. Hume Webster refers to Mr. Alfred J. Smith's champion stallion Wedgwood, who, at the time he wrote, was five years old, and measured 7 ft. 10 in. in girth and 10¾ in. below the knee—a very considerable measurement, when it is remembered that there is no hair included in the dimension given. Wedgwood, it may be stated, was foaled in the year 1886, and was the winner of the championship at the show of the Royal Agricultural Society of England.

The Suffolk, moreover, is credited with a very enviable reputation for being a good horse so far as the soundness of his feet is concerned, and consequently it is claimed for him that he lasts longer upon the stones of a town than any other variety that is put to the same class of work. Longevity, indeed, is one of the chief claims that Suffolk breeders insist upon making for their horses. As an instance, it is stated in the society's stud-book that at one of the exhibitions held by the Suffolk Agricultural Society, a brood mare, aged 37 years, was amongst the competitors, and at that time she was accompanied by a sucking foal. Julian's Boxer travelled as a stallion for twenty-five seasons. The dam of Lofft's Cupbearer, owned by the Rev. O. Reynolds, of Leabeach, was one of the sixteen foals which her owner had bred from her dam in sixteen years, and the mare from which Rising Star, the first prize horse at Leeds in 1861, was bred, was 22 years old when the colt was foaled. These are a few instances of the longevity and vitality of the Suffolk horse, and these could be multiplied many times were it necessary to do so, but enough has probably been written to convince the reader, if he were unacquainted with the fact before, that the breed now under consideration is a very remarkably long-lived and fruitful one.

The extreme docility of the breed is another great point in its favour, as it is something for an owner to feel that he possesses a strain of horses that rarely, if ever, develop vice; but, on the contrary, are usually endowed with the sweetest of tempers and generosity. That the Suffolk is a very willing horse is rendered quite apparent by a visit to any farm upon which he is employed. Unlike many chestnuts, too, the natural gameness of the Punches is not neutralised by hot-headedness or vice of any kind.

On the contrary, they are a somewhat phlegmatic dispositioned variety, though they possess an amount of courage which enables them to face and endure the hardest of work. Above all things, he is an agricultural horse; but, where pace and strength combined are required, as in the case of town work, he is equally at home. Beyond all question of doubt, he is the most nimble and active of all the so-called heavy varieties, whilst the Suffolk, for his size, is an extremely small feeder, and will flourish and look well upon an amount of food that would be totally insufficient for many other big horses.

The head of the Suffolk Punch shows more breeding and quality about it than that of any other heavy horse, a very conspicuous feature being the eye, which is full of expression, yet mild and intelligent-looking. The neck is powerful and well formed, and the crest beautifully turned. The headpiece is well carried; the shoulders, which are very long, lie rather forward, this being desirable for the purpose of draught. The chest is wide and deep, the girth of the middle-piece being very considerable, while the body, as a whole, is long and substantially built. The back is very strong, the hind-quarters long and heavy, and close coupled with the loin, the legs standing well under the body. The fore-legs—a very essential point, for, however good an animal's top may be, he will be worthless if he has no legs and feet to carry him—must be short and flat, possessed of plenty of hard bone, big and free from feather, whilst the pasterns are short and powerful with little hair on them, the feet being of a good size and truly shaped. In general appearance, the Suffolk Punch is very happily described as being long, low, and wide, and this summary of his outline cannot possibly be bettered:—

"The Suffolk is an excellent mover, with a smart, quick step, a true balance all round at the trot, and a magnificent walker." As may be naturally supposed, an ultra-high flashy action is not desired, and it is naively added that "a horse weighing a ton, bending his knee up to his throat-latch, and striking the granite with his feet like a sledge-hammer, is not an exhibition that the Suffolk trader delights in." In fact, a Suffolk that is heavy enough for the largest dray is seldom, if ever, called upon for an exhibition of speed and high action. Even if he is only up to ordinary van work, he is never likely to be wanted to go more than 7 or 8 miles an hour, and this class of animal will never scale a ton.

ENDURANCE OF THE AUSTRALIAN HORSE.

Of the endurance, staying power, or what is termed "bottom," of the Australian horse, many instances can be given. A late horse-breeder said that, in 1873, he rode, with a weight of 13 stone, a half-bred Cleveland 95 miles in one day, between the hours of 6 o'clock a.m. and 10 o'clock p.m., with only two breaks of three-quarters of an hour each. Mr. Galvayne, the Australian horse-trainer, mentions having ridden a mare 168 miles in two days; and a Mr. Archie Ferguson, of Wallon, on the Dawson River, Queensland, rode a little horse, named Billy Button, 70 miles between the midnight and daylight of the following morning. Mr. T. S. Collins, of Eton Vale, Queensland, rode a horse, named Bonnie Doon, 104 miles between the hours of 8 a.m. and sundown. Mr. P. Bolger, on a horse named Boomerang, near Rockhampton, rode 105 miles between sunrise and sunset. A doctor at Mudgee drove a pair of ponies 120 miles to see a patient in one day. A Mr. Evans, who rode 17 stone, rode, in one day, from a station near Hillstone to Hay, a distance of 111 miles; a Mr. Henry, of Swanhill, had a station 110 miles distant, and frequently drove this distance, with half-bred Clevelands of his own breeding, in one day, returning on the next, thus making a journey of 222 miles in two consecutive days. None of the horses above referred to suffered in the slightest degree from the effects of these long and tedious journeys.

In our article on the Suffolk Punch we were able to record our own experience of the remarkable performance of a Queensland-bred horse of that breed which covered a waterless journey of 120 miles with a rest interval of only two hours.

When one considers the rough treatment that some horses receive, travelling day after day a long overland journey from dawn to dark, many nights with no greater refreshment than a whack on the rump with the bridle as they are turned out to grass on land often as bare as your hand, the endurance of many of the Australian horses is simply marvellous.

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, MAY, 1919.

The weather conditions during the month have not been satisfactory for egg production. The sudden and varied changes have upset the light breeds considerably, but it is pleasing to note how the birds that had started kept to their work in the heavy section, in many instances putting up some fine scores for the time of the year. A performance of note was the laying of Mr. R. Holmes's E bird, which laid her first egg on the 9th April, and produced fifty eggs in fifty-three days. The same owner's C bird laid thirty eggs in the thirty-one days of May. Birds are moulting in pens owned by the following:—Messrs. Fraser, Taylor, Chester, N. A. Singer, Sparrow, Mrs. Kurth, and Mar's Poultry Farm. Warts in a mild form appeared in a few pens, and bowel troubles, caused by chills resulting from the indifferent weather, were responsible for some of the checks in the output of several of the pens. The feeding in the light section is not so good as it should be. The pens showing poor feeding are those in which the laying is indifferent; misses of three and four days between eggs have occurred in some cases. There were nine cases of broodiness during the month. The following are the individual records:—

Competitors.	Breed.	May.	Total.
	LIGHT BREEDS.		
*W. Hindes	White Leghorns ...	126	232
*Dixie Egg Plant	Do.	106	222
*J. M. Manson	Do.	121	217
*E. A. Smith	Do.	119	199
*G. W. Hindes	Do.	99	189
*Dr. E. C. Jennings	Do.	99	188
*Range Poultry Farm	Do.	93	187
*T. Fanning	Do.	125	187
*Haden Poultry Farm	Do.	97	184
J. H. Jones (Toowoomba)	Do.	85	184
G. Williams	Do.	94	177
*C. P. Buchanan	Do.	97	172
*W. Lyell	Do.	82	171
S. McPherson	Do.	83	167
G. J. Byrnes	Do.	101	167
*W. Barker	Do.	97	164
*B. Caswell	Do.	97	164

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	May.	Total.
LIGHT BREEDS—*continued.*			
*H. Fraser	White Leghorns	84	164
*Quinn's Post Poultry Farm	Do.	67	157
S. W. Rooney	Do.	72	154
H. A. Jones (Orallo)	Do.	92	153
Geo. Trapp	Do.	73	153
*Mrs. R. Hunter	Do.	90	143
*Thos. Taylor	Do.	48	138
Oakleigh Poultry Farm	Do.	67	130
*L. G. Innes	Do.	67	125
Mrs. N. Charteris	Do.	48	120
B. Chester	Do.	49	115
R. C. J. Turner	Do.	69	109
W. A. Wilson	Do.	60	107
H. O. Jones (Blackstone)	Do.	52	103
*Mrs. A. G. Kurth	Do.	71	98
G. H. Kettle	Do.	78	88
*O. W. J. Whitman	Do.	33	87
N. A. Singer	Do.	33	86
*J. J. Davies	Do.	78	85
*Mrs. L. Anderson	Do.	58	85
W. Morrissey	Do.	52	81
C. A. Goos	Do.	21	78
J. H. Dunbar	Anconas	35	57
J. W. Newton	White Leghorns	36	36
HEAVY BREEDS.			
*E. M. Larsen	Black Orpingtons	127	249
*R. Holmes	Do.	146	240
Geo. Nutt	Do.	109	222
*A. E. Walters	Do.	131	219
*R. Burns	Do.	102	202
*W. Smith	Do.	110	198
*Nobby Poultry Farm	Do.	99	194
*A. Shanks	Do.	101	179
*E. F. Dennis	Do.	97	177
*E. Morris	Do.	116	172
*Kelvin Poultry Farm	Plymouth Rocks	104	171
*D. Fulton	Black Orpingtons	86	168
*Jas. Ferguson	Chinese Langshans	94	151
Burleigh Pens	Black Orpingtons	63	134
*T. Hindley	Do.	89	131
*H. Puff	Rhode Island Reds	95	131
*W. H. Reilly	Chinese Langshans	55	116
A. Homan	Black Orpingtons	50	105
*Mars Poultry Farm	Do.	66	100
C. H. Singer	Do.	56	99
*T. B. Barber	Do.	82	94
R. B. Sparrow	Do.	41	91
*F. W. Leney	Do.	74	82
H. Ashworth	Do.	40	53
J. A. Cornwell	Do.	25	38
A. Gaydon	Do.	3	3
Total		5,355	9,542

* Indicates that the pen is being single tested.

RESULTS OF SINGLE HEN PENS.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS.							
W. Hindes	48	44	39	23	39	39	232
Dixie Egg Plant	31	40	41	43	38	29	222
J. M. Manson	34	34	37	35	38	39	217
E. A. Smith	26	37	43	38	17	38	199
G. W. Hindes	38	18	39	34	28	32	189
Dr. Jennings	35	19	35	30	28	41	188
Range Poultry Farm	21	35	36	45	19	31	187
T. Fanning	41	16	34	34	29	33	187
Haden Poultry Farm	38	37	35	27	24	23	184
C. P. Buchanan	14	38	30	26	30	34	172
W. Lyell	24	37	38	29	23	20	171
W. Becker	44	29	39	32	0	20	164
B. Caswell	18	12	28	41	39	26	164
H. Fraser	17	31	38	27	19	32	164
Quinn's Post Poultry Farm ...	22	26	37	28	21	23	157
Mrs. R. Hunter	16	36	28	28	19	16	143
Thos. Taylor	39	10	12	31	31	15	138
L. G. Innes	13	27	8	26	24	27	125
Mrs. A. G. Kurth	30	20	24	23	0	1	98
O. J. B. Whitman	20	38	3	0	13	13	87
J. J. Davies	6	0	21	21	27	10	85
Mrs. L. Anderson	18	34	0	0	13	20	85
HEAVY BREEDS							
E. M. Larsen	41	47	39	32	48	42	249
R. Holmes	48	49	45	35	50	13	240
A. E. Walters	35	36	45	35	28	40	219
R. Burns	34	34	33	49	20	32	202
W. Smith	32	43	19	16	42	46	198
Nobby Poultry Farm	27	33	24	41	36	33	194
A. Shanks	12	14	44	43	27	39	179
E. F. Dennis	43	3	43	39	5	44	177
E. Morris	37	32	24	35	37	7	172
Kelvin Poultry Farm	47	14	21	19	36	34	171
D. Fulton	26	30	27	24	40	21	168
Jas. Ferguson	36	35	18	13	14	35	151
T. Hindley	39	34	0	28	14	16	131
H. Puff	34	0	26	38	17	16	131
W. H. Reilly	20	16	23	30	11	16	116
Mars Poultry Farm	0	36	29	3	0	32	100
T. B. Barber	3	22	12	20	12	25	94
F. W. Leney	8	15	25	34	0	0	82

EXPERIMENT OF CHEAP FEEDING OF LAYING HENS.

The British "Journal of the Board of Agriculture," publishes the following notes of an interesting experiment made under unfavourable conditions, of the cheap feeding of laying hens, communicated by a correspondent of that journal:—

"*No grain or grain product whatever was fed to the hens during the four and a-half months' tests.* The food was a vegetable waste, say, cabbage, two parts; carrots, turnips, and onions, together, one part; potatoes, six parts, plus one part fish meal, fed as boiled. A cabbage to peck at was occasionally hung up.

The food ratio was kept as nearly one to three as possible and tested by analysis occasionally.

The hens were kept under ordinary backyard conditions and no grass surface was available. Comfortable but inexpensive accommodation was provided for roosting and a small covered area for scratching, the balance of yard surface being gravel or ashes. The health of the hens has distinctly improved during the period of the test.

On 14th February, two hens—A and B—were purchased from a local dealer at a cost of 7s. each, understood to be on sale for killing purposes, and a third hen, C, was given for test purposes, free of cost, by a friend who was hopeless of getting eggs from her.

Hen A, which was of the White Wyandotte type, though possibly not pure, started to lay on the 9th March, and during the month of March gave 18 eggs, missing on the 10th, 12th, 14th, 19th, and 25th. In April she gave 24 eggs, missing on the 4th, 9th, 14th, 19th, 20th, and 23rd, while in May she gave 26 eggs, missing on the 4th, 14th, 21st, 25th, and 30th. In June she gave 22 eggs, missing on the 4th, 8th, 12th, 16th, 19th, 23rd, 26th, and 29th.

Her weight has varied a few ounces down, and latterly up again to her original weight.

Hen B, mongrel type, started to lay on the 16th March and gave 12 eggs, missing on the 17th, 20th, and 24th. In April she gave 15 eggs and was broody from the 6th to the 19th inclusive and missing on the 28th. In May she gave 11 eggs, missing on the 1st and 30th, and being broody from the 9th to the 26th inclusive. In June she gave 17 eggs, missing on the 29th and 30th, and being broody from the 8th to the 16th inclusive.

Hen C, mongrel type, was in poor condition and when she came had every appearance of liver trouble. She gave two eggs only in April, one on the 20th and one on the 30th. In May she gave 25 eggs, missing on the 3rd, 9th, 13th, 19th, 23rd, and 30th, and in June she gave 22 eggs, missing on the 8th, 13th, 17th, 18th, 22nd, 24th, 27th, and 30th.

Some Wyandotte chickens which had been reared to three months old on corn and soft mash have, for the past month, been fed on the same mixture of waste vegetable material with fish meal, and on weighing the cockerels on 1st July, they averaged 3¾ lb., the pullets averaging 2½ lb., and all appear to be in excellent growing condition.''

THE MUSCOVY DUCK.

SELECTION OF THE STOCK.

(By R. T. G. CAREY, Beerwah.)

This is a matter which beginners and amateurs must have in future view, and there should be no difficulty in determining what is best suited for the requirements. As a rule, the selection aimed at is generally size, rapid growth, and trueness of type. The family merits being rightly gauged, the parents impress upon the progeny their own characteristic. Good points are reproduced and improved upon; but bad points do appear and may be aggravated unless care is exercised in the breeding. By skill and knowledge the former can be increased and the latter decreased and finally eradicated; but vigilance must never be relaxed, or the bad qualities are apt to return.

The drakes influence external structure and characteristics likewise; therefore the choosing of the male or males must have size—not merely large by fat, or fluffy by feathers, but size of bone, structure, well covered by flesh, skin, and feathers; whereas small-framed males seldom produce large drakes, nor abnormally large big fellows, but, rather, have the tendency to transmit dwarfness, the descendants being often weak or deformed. Keep to careful examination and handling, feel for deformity in body or limbs, seek for defects or blemishes, and reject those culprits. It also cannot be impressed too strongly that any bird with the slightest sign of disease or hereditary taint should never be bred from.

The selected bird should be firm and close in body, of good size (but not abnormally or excessively large), well developed, strong, and short on the legs, deep in the body, and active in habits.

The duck must bear all the outward characteristic and movements, and be shapely, well built, and of fair size. Stamina and good condition are of equal importance. Both sexes have certain and defined influences upon their offspring which are acquired

by careful observation, being a guide to enable us to make the selection required. Whilst the female controls internal structure, temper, fecundity, and habit, the male controls the frame and outward delineations.

As the stock increases, so in like manner must accommodation, attention, and observation correspondingly increase. It is a bad policy to adopt the "to wait and see" and "what-will-be-done-next" method of doing things. The culture must have a leading spirit; every detail must be ahead of its time—always awaiting for the possessor. Many a novice breeder allows a muscovy duck to hatch her own eggs, and permits her to parade her family according to her own sweet will, omitting to feed the youngsters; the result is small ducks.

The correct system to adopt is to gather the eggs from the best well-built and fine breeding ducks possible. That done, the rest remains with the raiser. The eggs are incubated according to methods—hens, ducks, or incubators. Five weeks after being hatched, the ducklings, when strong enough, are removed to their happy brooding ground for about three or four weeks; then given more range—with "plenty of shade" and shelter and good ventilated house at night, but do not overcrowd. They should be kept growing from the time they leave the shell till fit for market, which is about fourteen to sixteen weeks. The selected ducks for breeding purposes usually begin to lay from five to six months old.

The young drakes being previously removed after their sex is determined, they are hastened on for the Christmas market, being fed all they will consume, three times a day.

In mating allow one drake to three or four ducks, sometimes five. For fertility, these ducks or breeders must never be allowed to run into fat, or the egg yield suffers and hatching fails; as a rule, fertility is 98 per cent.

Select breeders from those hatched earliest in spring, when they are the most vigorous and strong, or purchase them from reputable breeders. Good stock drakes or ducks can be obtained for 10s. 6d. to 42s. each. It is always best to infuse new blood; it keeps the stamina and breed up to perfection.

Healthy, vigorous breeding stock that is properly handled means "hatchable eggs"; and it is a true saying that "*ducks well hatched are half raised.*"

[TO BE CONTINUED.]

PRICKLY-PEAR IN THE SOUTH.

The Sydney "Daily Telegraph" says that Mr. Ashford, Minister for Lands, has had some experiments made in the Pilliga scrub with a view to eradicating the prickly-pear. The fruit sprayings were made with arsenated soda, caustic soda being unobtainable owing to war conditions. Although the strongest solutions were used, the results were unsatisfactory. After investigation it was decided to test an improved pear poison which was being introduced, but with the imperfections of the atomisers then in use it was recognised that the quantity of poison used, having regard to its cost, would prevent its commercial use. Efforts were, therefore, directed to the improvement of the atomisers, working in collaboration with Mr. Roberts. These have been so successful that, with the practical experience gained, the departmental officers in charge have no hesitation in asserting that a means of destruction has been found which will destroy the pear, and at a cost far below that of any other method.

It has been proved that a light spraying of the leaves only is necessary to kill, the circulation carrying the poison to the bulb. It is unnecessary to spray the stems. This is contrary to previous ideas, and enables a considerable saving of poison. The result is contributed to by the great efficiency of the present atomisers. In treating with this poison, the pear should not be slashed or broken, as this destroys the circulation. The slashing of access lanes should be carefully avoided and is a waste of time, as in very dense pear the accessible part will fall quickly after spraying, and permit access.

In conjunction with the work of pear destruction a small test was made as to the effect of this poison on timber. Seventy-five trees, mostly box and a few apple and gum, averaging 12 in. to 15 in. in diameter, were frill rung and the poison applied with an atomiser under the low pressure of 10 lb. On inspection two weeks after spraying the tops were found to be dying.

The Orchard.

CITRUS CULTURE.

In reply to a correspondent who proposes to plant citrus trees this season, we cannot do better than give the advice offered by the Director of Fruit Culture, Mr. A. H. Benson. The first thing to lead to success is to give the trees a good start, and nothing is more conducive to a good start than having the land in the right condition for planting. It is much better to get the land ready first and to plant afterwards than to plant the trees as soon as the land is cleared and then to prepare the soil. The new land should be well cleared and well stumped, so as to leave as few roots in the soil as possible, because when large roots are left in the soil there is always the danger that, whilst they are decaying, root fungus will be conveyed by them to the roots of any citrus trees that may come in contact with them. If the clearing has been well done on the right kind of soil, the breaking up of the latter is not a difficult matter, and subsoiling will not be necessary. On the other hand, if the subsoil is of a hard or tenacious character, subsoiling must be carefully carried out so as to render it sweet and friable, provide good drainage, and permit the roots of the trees to permeate it freely. Lands that require subsoiling should, as a rule, be avoided for citrus culture, as they are not the most suitable for the growth of these fruits. The method to be adopted in breaking up the land depends on its condition, as if covered with a heavy sod of couch, blady, or other grasses it is not advisable to plough too deeply at first, but to just go below the sod. The land thus broken should be well harrowed with a heavy breaking harrow, so as to get all the roots of the grass to the surface, where they will soon be killed if the weather is favourable. The next thing is to cross-plough the land as deeply as possible, and left rough, so that it may become thoroughly sweetened and aerated. When this has taken place, the land should be well harrowed, and again cross-ploughed, this third ploughing being deeper than the second. The object of this third ploughing is to get the land as deeply worked as possible, so as to have a large quantity of soil in a state of fine tilth. If there is no surface grass or sod, then the first ploughing can be deeper, but the subsequent treatment of the land should be similar. The greater depth of soil you can reduce to the state of fine tilth the better for the trees, and the better the soil will retain moisture during a dry spell. A thorough preparation of the soil also tends to develop those micro-organisms which have the power of converting the insoluble nitrogen and ammonia in the soil into soluble nitrates that are easily assimilated by the plant or tree grown therein. This power of producing soluble nitrates in the soil, which is known as nitrification, is often somewhat deficient in raw virgin land, but is increased by the sweetening of the land and by the decay of the vegetable matter that is contained in it, and which the ploughings and harrowings have thoroughly mixed with the soil.

On no account should trees be planted on raw unsweetened land, as it is better to wait a few months and have the land in good order. When the soil is ready for planting it should be laid off in squares, which gives the trees more room, and is the easiest for cultivation. In the long run it will be found that it will pay to give them plenty of room. Close planting certainly gives the orchardist a quicker return for his outlay, but in a few years the trees become so crowded that their roots occupy every inch of the ground, and the tops are so near together, if not actually crossing, that horse cultivation is impossible, the soil in consequence becoming firm and hard, and neither absorbing nor retaining moisture well. Close planting has also one other great disadvantage, in that trees so planted are much more difficult to treat for fruit pests by means of spraying or cyaniding on account of the want of room to get at and around the trees properly.

On good citrus soil no seedling sweet oranges, Sevilles, or mandarins should be planted nearer than 30 ft. apart each way, and in the case of extra good land even wider planting is necessary. Worked trees of these varieties can be planted rather nearer, say 26 by 26 ft. Limes and citrons can be planted at from 20 to 24 ft. apart.

If the land has been prepared as described, planting is a simple matter. First of all trim the roots of the young tree, carefully cutting off all bruised and broken roots, and shorten back any straggling roots. In digging the hole for the tree put the top soil on one side, and the subsoil on the other, and only take out enough to give sufficient depth to enable the tree to be set at the same depth at which it stood in the

nursery, and to permit of the roots being properly spread out. There is no necessity whatever to dig very large holes. If the land has been well prepared, it is entirely waste labour. In digging the hole for the tree, see that the centre of the hole is slightly higher than the sides, so that the roots will tend downwards instead of upwards. When the tree is set in its right place by means of the planting board, scatter a little of the fine top soil over the roots, and work it carefully between them, continuing this until the roots are all well spread out and covered. If the soil is at all dry the tree should now receive one or more 4-gallon buckets of water, and when this has soaked in the hole should be filled up to the surface with the dry soil. This is far

PLATE 2.—EMPEROR MANDARIN.
Grown on Waterfall Creek, Ingham District.

preferable to surface watering, as it does not cake the ground. The water is placed just where it is wanted, and the dry soil placed above it prevents surface evaporation and tends to retain the moisture. There is no necessity to stake the young tree, and if it has been headed in the nursery no cutting back is necessary; on the other hand, if it has not been headed, then it should be cut back to a height of about 18 in., and allowed to develop from three to five branches with which to form the head of the tree.

As many amateurs are planting citrus trees, the above instructions given by the Director of Fruit Culture will doubtless be of service to them and save them from making mistakes.

WINDBREAKS FOR ORCHARDS.

The object of a windbreak is, as the word indicates, to break the force of the wind; and the object of breaking the force of the wind is to protect the trees from the injurious effects of exposure to the full force of it. The protection of the windbreak prevents the trees from becoming loosened or blown about by it, and thus having their growth checked. A windbreak also prevents trees from becoming unshapely, as they often do when exposed to the wind. It protects the trees from cold winds which would check the development of the trees during the growing season. Windbreaks prevent fruit from being blown off the trees, and in the prairie provinces in particular they help to prevent winter killing and the drying out of the soil by hot dry winds in summer.

At the Experimental Station at Charlottetown, P.E.I., Nappan, N.S., Ste. Anne de la Pocatiere, P.Q., and Cap Rouge, P.Q., it has been found necessary to plant windbreaks to protect the orchards which at all of these places are situated where they have little natural protection, and where frequently the winds are high and cold.

Windbreaks are necessary on the prairies to lessen the drying effects of the wind both in winter and summer. It has been found that trees suffer less from winter there, where they are protected by a windbreak.

In the Provinces of Ontario and British Columbia, and in parts of the Maritime provinces, where fruits are grown in valleys and on slopes where there is good natural protection, or where they are grown where high winds are not prevalent, windbreaks are not so necessary; and in fact in many cases it may be better to have no windbreak, as the windbreak lessens the circulation of air, and injurious insects are liable to multiply much more rapidly.

A good circulation of air is necessary, also, in combating fungous diseases, as it is important to have leaves and fruit dry off as soon as possible after dew or rain; hence anything like a windbreak, or unpruned trees, which lessens circulation, may do more harm than good.

In Eastern Canada the White and Red spruces make good trees for windbreaks, though the Norway spruce will in most places grow somewhat faster, and is a good tree for this purpose. A single row of these, planted from 8 to 10 feet apart is quite sufficient under most conditions. The windbreak should be at least 50 feet away from the first row of fruit trees in Eastern Canada. The Norway spruce will grow, if properly cared for, at the rate of from 2 to 3 feet a year until it reaches a height of 50 to 60 feet or more. In very exposed places it is desirable to plant two rows of trees, the trees forming the second row being planted from 8 to 10 feet behind the trees in the first row. The first row may be composed of American Arbor-Vitæ, which is rather slow growing, and the row behind made of Norway spruce or native spruce, if desired. White pine and European larch are also rapid growing trees which are useful for windbreaks in Eastern Canada. Scotch pine is inclined to be irregular in growth, and is on this account sometimes not satisfactory. Other trees, both native and exotic, will also give good satisfaction. Lombardy poplar planted about 8 feet apart makes a windbreak in a short time, as it is a very fast growing tree.

While windbreaks are useful in Eastern Canada, they are absolutely necessary on the prairies where there is no natural protection. A windbreak on the south and west sides of an orchard or small fruit plantation to check the hot winds is of as much or greater importance on the prairies than one on the north and east sides to check the cold winds, hence it is desirable to enclose a plantation with a windbreak. Fruit trees growing close to the south or west sides of windbreaks may be more injured than benefited by the windbreak, as in late winter or early spring the sun shining on the south or west side of a windbreak raises the temperature about the fruit trees much higher than if the windbreak were not there. The fruit trees thaw out every day, frosts are severe night after night, and these extremes cause severe injury or death to the trees. Whereas, when fruit trees are on the north or east side of a windbreak, this kind of injury is not so likely to occur, and they get the protection of the other windbreak from the cold winter winds.

Some of the most useful trees for windbreaks on the prairies are the Manitoba maple or Box Elder (*Acer negundo*), the laurel-leaved willow (*Salix pentandra*), the native white spruce (*Picea canadensis*), and the Siberian pea tree (*Caragana arborescens*).

In planting trees for windbreaks on the prairies, 4 feet apart in the row is a good distance for all of the above except the Siberian pea tree, which should be planted about 18 inches apart.—"Agricultural Gazette" of Canada.

"THE CARE OF YOUR ORCHARD."

is the title of a new booklet issued by the Vacuum Oil Company, Proprietary, Limited, Melbourne. It is most informative, dealing as it does with the various insect pests which attack orchard fruits, and which are especially numerous in tropical and sub-tropical countries, such as Queensland and others. To the orchardist, the little book gives most valuable information and advice on the subject, supplemented by numerous excellent illustrations. In its pages the fruitgrower will find full descriptions of the insect pests peculiar to our tropical fruits, as well as to those which thrive best in the cooler districts of Queensland, as, for instance, in the Toowoomba, Warwick, and Stanthorpe districts, where such fruits as apples, pears, plums, apricots, cherries, gooseberries, and strawberries thrive and attain the highest perfection. Heavy losses have been sustained by fruitgrowers in all parts of Queensland, owing to the attacks of predaceous insects which can only be held in check by the persistent and careful application of chemical and other sprays and washes. Of these there is a large variety on the market. Prominent amongst these is the spray under notice, called the "Gargoyle Prepared Red Spraying Oil," one which has been vigorously tested for the past sixteen years, with the result that its value may be considered authoritative. The spray pump is the orchardist's defence. Without it, he stands to be a heavy loser. His main concern is what spray to use. He may try many insecticides and, "*experientia docet*," he will learn by experience, and, from all that has been written and said about it, we should think that the spray under notice deserves the attention of our orchardists.

Horticulture.

NOTES ON NARCISSUS CULTIVATION.

In this climate, the best time to plant Narcissus and most other bulbs is March, but planting may extend to May with good results. As a general rule, the shorter the period the bulbs are out of the ground the better. In some cases, as in the *Poeticus* section, new roots are formed simultaneously with the drying of the old, and a decided injury is done by keeping such varieties out of the ground for a lengthened period. The best results are obtained by planting these early, about February.

Varieties to Cultivate.

Golden Spurs.—A deep, rich yellow trumpet. It is usually the first to bloom.

Emperor.—A large flower having a deep primrose perianth, and yellow trumpet.

Poeticus Ornatus.—This white Narcissus is probably the most profitable variety that anyone can handle, and in the Old Country is grown in large quantities for cut flowers, both in the open and under glass. It blooms very freely, and being a small bulb can be planted closely, thus giving a much larger yield than any other variety.

Poeticus Plenus, or Double White.—This is the last of all the Narcissi to flower. The bulbs may remain in the ground three to four years without transplanting.

Bicolor Grandee.—This is a late trumpet Narcissus which flowers after the majority of the others, and sells well as a cut flower.

Besides these, there are many other varieties stocked by Brisbane seedsmen which may be relied upon as true to name.

Marketing the Bloom.

Those gardeners who grow these flowers for sale should note that, as the blooms expand, they should be gathered, and marketed whilst fresh. An effort should be made to have the bloom fit for market earlier than would be the case if left to take its natural course. This can be accomplished by pulling the flowers when in the bud state and opening them in water under glass, or by erecting a temporary covering of glass over the growing plants. The grower who raises flowers for the market who has no glasshouse is at a great disadvantage, as without this he is at the mercy of the elements at a time when much rough and stormy weather is often experienced. The cultivator with glass can gather the flowers in the bud state, open them in water, and ensure all his blooms reaching the market clean and in good condition.

It is sometimes desirable to prolong the bloom for a few days. This is done by placing the buds in water in a cool, shady shed. The best receptacles in which to place the blooms are narrow troughs or boxes divided into several sections, each about 4 in. wide.

Apiculture.

TRIAL OF A SYSTEM OF KEEPING TWO QUEENS IN A HIVE.

The bees at the Central Experimental Farm, Ottawa, have produced an average of 121 lb. of honey per colony, spring count, during the six years 1913 to 1918, showing beekeeping to be a very profitable undertaking here when carried on by those who understand it and give the bees the right attention when they need it. The figures from the Experimental Farms at Nappan, N.S., and Lethbridge, Alta, are also high, and had these apiaries been under continuous expert care like the one at Ottawa, they would probably have produced about the same returns.

1.

The high yield at Ottawa was due, primarily, to the large number of warm and fine days and good average rainfall in spring and summer, the good soil in the neighbourhood and the continuous covering of snow in winter. It was due, directly in the main to the fact that these conditions are very favourable for the growth, nectar secretion and survival from year to year of alsike and white clover, the principal sources of the honey, and also to the remarkably long and favourable period for breeding bees from the time the snow disappears in mid-April until the honey flow from these clovers begins at the end of June.

A careful study of the conditions at Ottawa shows that the ordinary methods of beekeeping do not make full use of this breeding period, and that a still higher yield could be obtained were means to be devised that would do this and that would reduce a heavy loss of bees that takes place in the winter.

In regard to loss in winter, very few colonies died outright during the winter but many lost about half of their bees. An important cause of this loss was ascertained to be stores that were more or less unwholesome and granulated. In some years the loss was high, in others only moderate, and individual colonies varied much. The experiments showed that the clover honey was more wholesome for wintering than honey gathered later in the season. A certain amount of loss in winter was also due to an insufficient number of young bees raised during August.

In regard to the breeding period in spring, colonies that passed the winter with comparatively little loss became strong enough to swarm during the honey flow from dandelion at the end of May. This swarming interrupted the breeding of bees. Although it could usually be prevented by destroying all queen-cells every week, the time soon came when the queen reached the limit of fecundity, and before long the amount of brood raised every day ceased to increase.

Another, and in some ways the greatest, problem at Ottawa has been the control of swarming. This has become a problem of labour to a great extent. After the

first rush of swarming during the dandelion flow, there is a check during a honey dearth, more or less, that occurs in June, after which swarming reaches its greatest intensity during the honey flow from clover in July. The swarming season lasts altogether for about nine weeks, from about the end of May until the beginning of August. No single manipulation such as giving more room for the queen to lay, or raising brood to the super, will prevent swarming at Ottawa, but it has been prevented by destroying all the queen-cells every week for about nine weeks. This is a great labour and not always effective. Indeed the principal labour in the apiary

2.

has been preventing swarming by lifting heavy supers of honey off the hives and searching for and destroying all queen-cells every week. If swarming is permitted, not only is the honey crop reduced because the forces of the bees are divided, but the apiary has to be constantly watched to prevent the escape of swarms, a considerable disadvantage when the beekeeper has out-apiaries to attend to. There is, therefore, a great need for a sure method of preventing swarming without much labour.

The writer has attempted to meet these different requirements with a system of keeping two queens in each hive during eleven months of the year. This system has been tried on a small scale during the season of 1918. The trial has shown the system to be workable and preparations have been made for a more extensive test in 1919, not only at the Experimental Farm, but in the open country, some distance from the city.

Two young queens separated by a double wire-cloth screen were wintered in one hive in the cellar in 1917-18. During the honey flow from dandelion, the bees and queen on one side of the screen were transferred to a separate hive; thus the desire to swarm at this time was not allowed to develop, and there was an uninterrupted and steadily increasing production of young bees from the two queens, with the result that two strong colonies were obtained in time for the opening of the honey flow from clover, the number of bees produced much exceeding the number that was obtained in hives that began the season with only one queen, 480 lb. of honey were produced by these bees.

In order to prevent swarming during the clover honey flow and to again get two young queens in each hive (all the following stages were carried out in several colonies) the old queen was removed from the brood chamber at the commencement of this honey flow and eight days later all queen-cells were destroyed except two, one on each side of the wire-cloth division then inserted. A special portico fixed in front of the hives separated the entrance of each half of the hive from that of the other by about 9 inches, to prevent the queens that emerged from the cells from meeting after returning from their mating flights. No swarming took place.*

The two prolific young queens thus obtained caused the production of more brood in August than in an ordinary colony containing only one queen, so that more young bees were raised for wintering. There was also less honey stored in the brood chamber, and as soon as the supers were removed at the end of the honey flow in September, the bees were supplied with a wholsome feed for winter consisting of a mixture of sugar syrup and clover honey which they stored in the combs

* *See* Diagrams 1 and 2.

previously occupied by the brood. A colony on this mixture had wintered well the previous year. The colonies were placed in the cellar for winter.

Provision was made for supplying a selected queen and brood at the time when the white honey was removed in early August to any hive that had lost its queen. Provision was also made for feeding the bees slowly to maintain rapid breeding during the June honey dearth, and also for insulating the hives in spring and autumn.

By this system the number of colonies is doubled every year. Modifications of the system to give a greater increase and no increase at all were worked out.

The annual requeening in this system ensures against the loss that occurs in many apiaries due to old and worn-out queens; it is also the correct treatment for European foulbrood, the most destructive disease of bees in the Ottawa Valley. In the experiments, queen-cells containing Italians of selected parentage were substituted for those raised in the colony, except in a few cases.—"Agricultural Gazette of Canada."

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF MAY, 1919, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING MAY, 1919 AND 1918, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	May.	No. of Years' Records.	May, 1919	May, 1918		May.	No. of Years' Records.	May, 1919.	May, 1918.
North Coast.					*South Coast*—continued:				
	In.		In.	In.		In.		In.	In.
Atherton	2·13	18	4·04	2·24					
Cairns	4·47	37	6·19	3·81	Nambour	4·99	23	11·41	6·59
Cardwell	3·57	47	5·95	2·01	Nanango	1·63	37	2·91	0·48
Cooktown	2·92	43	6·06	1·18	Rockhampton ...	1·53	32	4·88	1·02
Herberton	1·64	32	2·99	0·91	Woodford	2·90	32	7·69	2·75
Ingham	3·43	27	3·95	2·20					
Innisfail	14·82	28	21·74	7·36					
Mossman	2·40	11	4·24	1·18	*Darling Downs.*				
Townsville	1·36	48	0·28	0·01					
					Dalby	1·33	49	2·99	0·24
					Emu Vale ...	1·17	23	2·59	0·31
Central Coast.					Jimbour	1·24	31	1·54	0·16
					Miles	1·65	34	1·45	0·32
Ayr	1·16	32	0·42	0·04	Stanthorpe ...	1·95	46	3·46	0·27
Bowen	1·37	48	0·31	0·26	Toowoomba ...	2·31	47	4·27	0·78
Charters Towers ...	0·79	37	0·52	*nil*	Warwick	1·63	32	2·98	0·23
Mackay	3·85	48	9·99	2·04					
Proserpine	5·53	16	4·89	5·08					
St. Lawrence ...	1·86	48	3·00	1·41	*Maranoa.*				
South Coast.					Roma	1·53	45	2·24	0·06
Biggenden	1·91	20	2·66	0·76					
Bundaberg	2·73	36	6·53	1·01	*State Farms, &c.*				
Brisbane	2·94	68	5·47	2·49					
Childers	2·38	24	2·71	1·01	Bungeworgorai ...	0·53	5	1·88	0·05
Crohamhurst ...	5·00	25	11·41	5·09	Gatton College ...	1·83	20	2·97	1·02
Esk	2·09	32	5·42	0·53	Gindie	1·10	19	1·49	1·84
Gayndah	1·61	48	1·56	0·54	Hermitage ...	1·22	13	3·40	0·23
Gympie	3·07	49	5·85	1·91	Kairi	1·68	5	4·27	1·65
Glasshouse Mtains	3·32	11	10·37	3·33	Sugar Experiment Station, Mackay	3·53	22	5·94	2·31
Kilkivan	1·99	40	2·99	0·98	Warren	0·41	5	3·56	0·53
Maryborough ...	3·09	48	6·35	1·95					

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for May this year, and for the same period of 1918, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND, State Meteorologist.

Dairying.

STRAINING MILK.

The United States Department of Agriculture has conducted investigations on the principal sources of impurity in milk, and the "Farmers' Bulletin 1019" contains the following amongst other results of the labours of the Federal experts:-

Strainer cloths containing 35,000,000 bacteria per square inch have been found in use on dairy farms.

The average strainer cloth, of which about 36 square inches is in contact with the milk, is likely to contain fully a billion bacteria if it is not washed and sterilised after each milking.

If the cloth is folded, the number of bacteria is likely to be still greater.

Milk produced under conditions where utensils were not sterile was found to contain more than 666,000 bacteria per cubic centimeter.

When all utensils were sterilised, the average bacterial count was only about 31,000 per cubic centimeter or less than one-twentieth as many.

Bacteria in milk are not necessarily injurious to health, but they reduce its keeping quality. Certain kinds of bacteria, if too numerous, also affect its palatability. For the production of clean milk the Department of Agriculture urges strict sanitation in every dairy operation.

Utensils and strainer cloths should be thoroughly washed with warm water and washing powder, then rinsed in clean water and sterilised by boiling or steaming for five minutes. After sterilisation, the utensils, including pails, cans, strainers, and strainer cloths, should be hung in a clean place where they will be protected from flies and dust. Milk as it leaves the udder of healthy cows is clean and pure and may be kept so by following the methods outlined.

CRUSHING DATES: 1919 SEASON.

As previously stated, the crushing season this year will necessarily be later than usual, owing to the prolonged drought through which the country has passed; and it is still uncertain as to what mills will start in some of the Southern districts, owing to the shortage of cane available. It has been estimated that of the total number of mills in Queensland, there are probably about ten which will not turn a roller this season. The following dates are of course liable to alteration to seasonal developments; but they are as near as can be ascertained at the time of going to press:—

Goondi	About middle of July.
Mourilyan	Second week in July.
Victoria (Herbert River)	24th June.
Pioneer (Burdekin)	15th August.
Inkerman (Burdekin)	5th August.
Pleystowe Central (Mackay)	Mid-July.
Moreton Central (Nambour)	Mid-August.
Alberton	September.
Steglitz Mill Co.	18th August.
Kalamia (Burdekin)	Some time in July.
Racecourse Central (Mackay)	30th July.
Mulgrave Central (Cairns)	Mid-July.
Heck's Mill, Pimpama Island	End of July.
Hambledon (Cairns)	End of June.
Plane Creek (Mackay)	24th July.
Cattle Creek (Mackay)	Last week in July.
Marian Central, Mackay	About 30th July.
Babinda Central, Cairns	About 28th June.
Mossman Central	About 19th June.

—"Sugar Journal."

Tropical Industries.

THE CULTIVATION OF SUGAR-CANE IN QUEENSLAND.

By HARRY T. EASTERBY, General Superintendent, Bureau of Sugar Experiment Stations.

PART III.

It may now be useful to intending sugar-growers to give a list of different sugar districts with their sub-districts, the mills situated therein, and a few descriptive notes:—

MOSSMAN.

This, at present, is the most northerly sugar district, and is situated near Port Douglas, about four hours' steamer journey north of Cairns. The soil is nearly all alluvial, and comprises forest and scrub—mostly the latter. Good cane crops are raised; the climate is exceedingly favourable, the average rainfall being about 82 in. per annum, while the humidity during the cane-growing season is high. Land can be obtained upon reasonable terms, and the district generally may be described as a good one for cane-growing. The principal varieties grown in this locality are:—New Guinea 15 (Badila), N.G. 24 (Goru), 24A and 24B, D1135, B147, and H.Q. 426 (Clark's Seedling). The cane area is well served by tramways. The Mossman Central Mill is capable of manufacturing 10,000 tons of sugar, and is a co-operative concern under the management of a Board of Directors.

CAIRNS.

This is one of the finest sugar districts in the State, and possesses an excellent port. The sugar lands vary in nature, and are contained principally along a valley running south between ranges to the Russell River, along the route of the Coastal Railway. The cane lands commence shortly after leaving Cairns; and most of these are volcanic red soils around the Hambledon Sugar Mills, of good quality, and yielding fine crops of cane with the aid of good cultivation and fertilisers. Proceeding farther along the main line a belt of poor forest country is passed through, and then the beautiful cane areas around the Mulgrave Mill are reached. These are mainly alluvial lands, situated on the Mulgrave River, though there are also volcanic areas along the ridges. After crossing the Mulgrave River, the Aloomba cane lands are reached. These lie about 20 miles from Cairns, and comprise mostly first-class agricultural soils of an alluvial character. Most of the land was under scrub many years ago. To the south of these areas lie the now well-known Babinda lands, which may roughly be said to be comprised between Fishery Creek, the Russell River, and the Bellenden-Ker and Graham Ranges. The soils are for the most part alluvial, light in colour, with a porous subsoil. There is, however, a large area of red volcanic soil on the ridges, and, near to the Russell, practically the whole area is scrub land; and the climatic conditions for the growth of cane are exceptionally favourable, there being a very large rainfall combined with a high relative humidity. In the Cairns district there are at present three mills operating. The Hambledon Mill is the property

of the Colonial Sugar Refining Company; Mulgrave is a Central Co-operative Mill run by a Board of Directors; and Babinda is a Government Central Mill, ultimately reverting to the farmers. The amount of sugar that can be manufactured in the district with the existing mills would be in the region of 38,000 tons. All the areas around the mills are served by tramlines, and a good deal of cane is also carried along the main 3 ft. 6 in. line. The principal varieties grown are:—N.G. 15 (Badila), 24 (Goru), 24A, 24B, H.Q. 426 (Clark's Seedling), D1135, and B208. The Babinda Mill is new, and thoroughly up to date, and is capable of treating 165,000 tons of cane. New lands to the south of the Russell have recently been opened up to supply cane to this factory. To a passenger along the main line, the narrow valley between Aloomba and Babinda displays a scene of the greatest activity: planting, harvesting, and cultivation operations going on simultaneously, while large amounts of cane are being transferred to rail trucks at every siding. Altogether, this district may be summed up as a highly prosperous one and where an intending cane farmer with some capital could do remarkably well. The average rainfall varies from about 90 in. near Cairns to some 150 in. at Babinda. There is also a fine area of alluvial cane lands along the Cairns-Herberton Government Line, close to Cairns, known as Freshwater.

INNISFAIL.

This is also one of the best cane-growing districts, situated between Cairns and Townsville, on the Johnstone River, and hence frequently called the Johnstone River District. The sugar lands about Innisfail are mostly alluvial, following the river; while red volcanic soils are found back from the river on the ridges. The Mourilyan soils are also chiefly alluvial; while the South Johnsone lands near the mill are red volcanic ridges, with alluvial flats near Liverpool Creek. There are also fine red soils on the Daraji side of the North Johnstone, close to the river; but the red volcanic soils of the ridges, lying farther back, are not so good in quality. The lands surrounding the Mourilyan and Goondi Mills have been much longer under cultivation than the Daraji, Liverpool Creek, and South Johnstone areas, and are nearly all cleared and improved farms. Around the South Johnstone Mill the cane, at the present time, is being grown upon new scrub lands still under stumps. Lying farther to the south are the rich tropical scrubs of the Banyan and Tully, to which the North Coast Railway is at present being extended for the purpose of placing returned soldiers on the land for cane-growing. This cane, when grown, will be railed to the South Johnstone Mill.

The whole of the Innisfail District is particularly well adapted for cane-growing. The average relative humidity is 80 per cent., the highest probably in Australia; while the average rainfall is also very large—viz., 149 in. In consequence of these two factors, cane thrives splendidly, and the yields per acre are good and could be made much better. The district is well served by both mill and Government tramlines. The principal variety of cane grown is N.G. 15 (or Badila), which does exceedingly well in this locality. There are three mills—Goondi, Mourilyan, and South Johnstone. The first is the property of the Colonial Sugar Refining Company; the second belongs to the Australian Sugar Company; while the new, large, up-to-date factory at South Johnstone was erected by the Queensland Government. It is a sister mill to Babinda, and is redeemable by the farmers in the course of time. The three mills are capable of turning out about 40,000 tons of sugar.

HERBERT RIVER.

This fine cane-growing district is about 70 miles north of Townsville, and south of Innisfail, and comprises nearly all alluvial soil on the Herbert and Stone Rivers. Much of the country was originally forest, though a fair amount of scrub land is also under cultivation. The soils are mostly dark in colour, with clay subsoils, and grow particularly good crops of cane. There is still a good deal of land to be opened up, principally first-class forest, along the lower terraces of the Herbert River and creeks intersecting that area; but this would require opening up by tramways. The settled part of the district is connected by a large tramway system which conveys cane to the two mills and takes out goods for farmers from Lucinda Point, the port of this district. Passengers are also carried, so that means of transit are well attended to. The relative humidity is high, while the average rainfall is about 82 in. There are two sugar mills—Victoria and Macnade, the property of the Colonial Sugar Refining Company—capable of manufacturing 28,000 tons of sugar. The district can be well recommended as being entirely suitable for the growth of cane. The varieties of cane principally grown are:—N.G. 15 (Badila), 24 (Goru), 24A 24B, H.Q. 426 (Clark's Seeding), Q813, and B208, and D1135.

LOWER BURDEKIN DISTRICT.

We now reach a district differing in many particulars from the hot, humid cane areas of the North with their ample rainfalls. The Lower Burdekin areas, situated between 50 and 60 miles south of Townsville, comprise rich agricultural lands, but, unfortunately, possessing a rainfall not sufficient to ensure good crops of cane. This deficiency in rainfall is, on the northern side of the Lower Burdekin River, made up for by the use of irrigation water. All over what is known as the Lower Burdekin Delta water in plenty can be obtained by shallow sinking. The method in use is to drive spear heads, and then connect these up with a main from which the water is pumped and distributed by means of flumes to the surrounding cane fields. When irrigation is properly carried out, very large cane crops are ensured. Soils are deep to moderately deep alluvial loams, mostly heavy and dark, resting on granular and porous subsoils. There are also black loams with clay subsoils and sandy loams with sandy subsoils.

The greater part of the land around the township of Ayr is forest country originally bearing Moreton Bay Ash, Acacia, Cocky Apple, Beefwood, and some Popular Gum. Scrubs are found near the river at Rita Island and Jarvisfield, and these, as a rule, contain rich made land of great depth. On the south side of the river is what is known as the Inkerman District, the land being somewhat similar to that on the Ayr side. In order to provide irrigation water for this area, a large irrigation scheme has been initiated, and the works are now well advanced. The motive power will be electricity, which will operate motors upon the different farms, water being pumped out of deep cement wells. There are three mills in this district, viz.:—Pioneer, Kalamia, and Inkerman. The first and last belong to Drysdale Brothers, Ltd.; Kalamia being owned by the Australian Estates, Ltd. Between Townsville and Ayr lie the Haughton River sugar areas, which comprise good agricultural land adjacent to the river, and also lying nearer to Mount Elliot. The farmers in this locality have recently purchased the Invicta Mill, from near Bundaberg, which is now in course of removal. The four mills

should be capable of dealing with about 48,000 tons of sugar. The varieties grown are chiefly:—N.G. 15 (Badila), N.G. 24 (Goru), 24A, 24B, Q813, Q970, Q1121, M87, M89, H.Q. 426, and D1135. The average rainfall is about 45 in.

PROSERPINE.

This district is somewhat isolated, though it has the advantage of being connected by rail with Bowen (its port) and Townsville. It lies about half-way between Mackay and Bowen, and is about 160 miles south of Townsville. The country was largely forest before being cleared, and the soil is alluvial with a clay subsoil, and is wet in places, requiring surface drainage. Land may be obtained on reasonable terms, and the mill is capable of dealing with much larger crops than it receives at present. The principal varieties grown are:—Malagache, D1135, N.G. 15 (Badila), N.G. 24 (Goru), 24A, 24B, H.Q. 426 (Clark's Seedling), M.87, 89, 1474, Q1121, Q813, and Q903. There is one mill at Proserpine, owned by the State, which is capable of dealing with 7,000 tons of sugar. Tramlines connect the mill with the fields. Average rainfall, about 77 in.

MACKAY.

The district of Mackay is situated some 500 miles north of Brisbane, and is the largest sugar-producing area in the State, possessing no less than nine sugar mills. The number of cane farmers also exceeds that of any other district. The land is fertile, principally forest country, and has been a long time settled; consequently, it is all practically under the plough. The soils are mostly dark in colour, alluvial with clay subsoils. The sub-districts are:—Plane Creek (or Sarina), Racecourse, Palms, Pleystowe, Marian, Hatton, North Eton, Homebush, and Farleigh. The district of Mackay is within the tropics, and has a highly humid climate during the cane-growing season, averaging about 75 per cent. It is the farthest district south under which cane can be grown under tropical conditions, and is, on the whole, a fine district and capable of still farther expansion. Land may be procured on very easy terms, and is probably cheaper than in any other sugar district in Queensland, except perhaps Proserpine. The average rainfall amounts to 68 in. The mills are:—Farleigh (privately owned), Plane Creek (Central Mill, managed by Directors), Racecourse (ditto), Marian (ditto), North Eton (ditto), Pleystowe (privately owned), Farleigh (ditto), Homebush (Colonial Sugar Refining Company), Palms (privately owned), and Cattle Creek (ditto). These mills are capable of turning out some 65,000 tons of sugar, but are not anything like fully supplied on the average. Most of the mills have a system of tramways for the haulage of cane, but, generally, are not so well catered for as the more Northern factories. Hence a fairly large proportion of cane is carted to some of the mills by drays and wagons. The opening of the North Coast Railway from Rockhampton to Mackay, which event is expected next year, should add greatly to the district's prosperity. The average rainfall of Mackay is 68 in.

BUNDABERG.

The largest stretch of territory between any two sugar districts divides those of Mackay and Bundaberg. We have now left the tropical humid regions with their great rainfalls, and have reached what are known as the Southern sugar districts of Queensland. The district of Bundaberg is a large one, and comprises the sub-districts of Fairymead, Bingera, Gin Gin, Woongarra, Gooburrum, Avondale, Invicta, Sharon,

and North and South Kolan. The lands vary from deep, rich, red volcanic scrub land to rather poor forest country. There are also good alluvial flats near rivers and creeks. The price of land on the Woongarra Area is high; but land at lower rates may be obtained in other parts of the district on reasonable terms. The district is connected with Brisbane by rail (218 miles), and, being settled and prosperous, with a large city and good roads, is a favourite one for cane-growers desiring to make homes and settle down for the rest of their existence. Although subject to periodical droughts and frosts, the Bundaberg Area produces good crops of cane; and it has this great advantage—that cane being slower in growth will usually stand over well. Hence, if a drought is experienced one year, it is usually quite safe not to cut the cane, but to allow it to stand over till the next season when it is harvested. In this way the expense of cultivating and harvesting one crop is saved; and the standover crop is, as a rule, a heavy one, 60 and 70 tons per acre for the two years' growth being not uncommon. Upon the red soils the cost of cultivation is lower than in the North, due to the smaller growth of weeds. Ratoons are more frequently grown in these districts than in North Queensland, where cultivation is not usually carried beyond the second ratoons, while third and fourth ratoons are fairly common around Bundaberg. These are generally profitable. Altogether it may be said that, while not having the climatic advantages of the North, cane-growing about Bundaberg has many advantages, and it is a fine district to settle in, and the returns are good. There are now five mills in this locality, viz.:—Millaquin and Qunaba (the property of the Queensland National Bank), Fairymead (owned by the Fairymead Sugar Company), Bingera (Messrs. Gibson and Howes, Ltd.), and Gin Gin (Government Central). These are capable of manufacturing 50,000 tons of sugar. There is also a small mill situated at Baffle Creek, between 30 and 40 miles north of Bundaberg, principally a German settlement. The average rainfall of Bundaberg is 44 in., and the relative humidity about 68 per cent.

CHILDERS.

This is a large sugar district, situated about 20 miles south of Bundaberg. The country is an immense pocket of red volcanic soil—for the greater part rich and deep, and formerly covered with scrub. Land in this area commands a high figure for the same reasons as have been detailed with reference to the red soils in the Bundaberg District. Much of the remarks made in the preceding section also apply to this district, particularly with reference to droughts, frosts, weeds, and stand-over crops. The country is undulating, and in good seasons very fine crops are harvested. There are three mills, viz.:—Childers (Colonial Sugar Refining Company), Doolbi (Queensland National Bank), and Isis (Central, managed by Directors). The average rainfall is 42 in.

MARYBOROUGH.

This district, at one time, grew a great deal more cane than it does to-day, there being once 15 mills on this area. It may now be said to be decidedly declining from the point of view of sugar production, as dairying and agricultural crops other than cane are engaging the attention of farmers. There is one mill (owned by Messrs. Kinne, Randall, and Braddock); but it draws a good deal of its supplies from districts outside Maryborough. The capacity of the mill is about 3,500 tons of sugar. The average rainfall is 46 in.

PIALBA.

This is a small sugar-growing district, some 25 miles from Maryborough. The soil is inclined to be stony in places; but there are many patches of superior land, a good deal of which once carried scrubs of a light nature. There is no mill here; and cane is railed to factories at Maryborough, Isis, and Mount Bauple. The average rainfall is 38 in.—not sufficient to ensure maximum crops of cane every season.

YERRA.

Another small district close to Maryborough, on the Gayndah Line. There is some fair to good land in pockets. All cane grown is railed to outside mills. There is no record of rainfall.

MOUNT BAUPLE.

This district is situated between Maryborough and Brisbane, and comprises fairly good agricultural land. It suffers, however, periodically from dry weather. There is one mill (a Government Central) with a capacity of 4,000 tons of sugar. The average rainfall is, like many Southern districts, not sufficient to secure maximum crops every year.

MORETON.

This is one of the best of the Southern districts, the land being, for the most part, good to rich alluvial flats, the remainder being ridges of not so good quality. The soil is mostly dark to chocolate. Along the Maroochy River some very fine land is found, producing excellent crops of cane. The district is about 60 miles north of Brisbane, and is a good one to settle in. Due to its comparatively large rainfall (61 in.), it is more tropical in its nature than other Southern districts and the scrubs are more dense. There is one mill—the Moreton Central—situated at Nambour with a capacity of 4,500 tons of sugar.

LOGAN AND NERANG.

These districts have also declined in sugar production, farmers going in for other agricultural crops. There still remain six small mills, but the total output is small.

All the districts enumerated above have full facilities in the way of post and telegraph offices, schools, and public buildings. There are also a number of cities and towns in many of the districts—such as Cairns, Innisfail, Ingham, Ayr, Proserpine, Mackay, Bundaberg, and Maryborough.

[TO BE CONTINUED.]

REPORT ON SOME NORTHERN SUGAR DISTRICTS.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report from the Field Assistant, Mr. J. C. Murray, with reference to the sugar districts of Eton, Homebush, Palms, Proserpine, Bowen, and Ayr:—

HOMEBUSH.

This area was looking well, and there was every prospect of a fair harvest. No specially heavy downfalls of rain had been registered during the few past months, consequently washaways and the usual amount of damage done by intense

tropical storms were not in evidence. A fair amount of water was lying about on the ground, caused by light showers in the latter end of March.

Agricultural operations with regard to cane planting are conducted here on much the same lines as other portions of the Mackay district. Many of the growers go in considerably for green manuring, cowpea being the principal crop used in this respect. It would probably be a good scheme if a special farm in each district could be used on a co-operative basis for the propagation of this and other seeds useful in raising green crops.

The principal cane varieties grown are Malagache, Clark's Seedling, and D 1135. Of these the former variety seems to give the most satisfactory results to the growers. It possesses a good average density, is a good ratooner, stands bad weather conditions, and is fairly free from attacks by the usual cane pests and fungoid parasites. Clark's Seedling and D 1135 are satisfactory, most of the growers being in favour of continuing the cultivation or these canes.

With regard to cane pests in the Homebush area, coots are the worst.

The soil on these plain lands is a dark loam. Grasses such as spear, nut, and blady grass are prevalent. Nut grass is by far the most difficult to keep in check.

The Homebush district seems specially suitable for irrigation. If a barrage was placed in the river above the cane farms, the water would probably gravitate over many portions of the land. Water is obtainable by sinking in ordinary dry periods at about 25 feet.

A very little liming has been done in this area. This is probably due to the expense and difficulty of obtaining this commodity. That it is most essential is shown by the fact that a large percentage of the tests taken showed the land to be sour. No outstanding agricultural experiments were noticeable in the Homebush area.

ETON AND NORTH ETON.

These areas were looking well, with every prospect of a fair crushing. Good showers of rain had fallen during the last week in March, giving the cane a vigorous green appearance.

Of the many canes raised throughout these areas the varieties finding most favour with the growers are Malagache, Clark's Seedling, N.G. 24, D. 1135, and Badila. Practically all these varieties are doing well. It is probable Badila responds quicker than the others to intensive cultivation and suitable fertiliser. Some plots under this variety look a picture, especially on Mr. Jackson's farm at North Eton. This gentleman has achieved a marked success in the use of molasses as a fertiliser. His usual method of preparation is to ensure the alkalinity of the soil by liming, then to spread the molasses broadcast by means of a tank on a dray, plough four times, and plant. In ratooning the dray is run down the rows and each stool treated with molasses. A farmer should use his own judgment with regard to the amount of molasses used, as all soil is not alike. Molasses should never be placed on sour land. It is improbable that it would be beneficial on soil that had other than strong lime properties.

This district is fairly free from cane pests, noxious weeds, &c. The soil is a dark loam with a clay subsoil interspersed with alluvial gravel. Seepage is considerable.

In common with other Mackay areas, lime would be beneficial on many of the holdings, as tests taken show acidity. Very satisfactory results are being obtained with some of the N.G. and Q. seedlings. Q. 813 and M. 89 are making a fair showing, also Q. 855. These varieties are all hardy cane with good density and ratooning properties. They seem to thrive well on moderate soils where cane such as Badila might fail.

PALMS.

At the time of visiting the management of this estate was busy with agricultural work prior to planting. The soil is a dark loam with a clay subsoil cultivating and draining well.

Artificial manures, such as sulphate of ammonia and guano, are being used by some of the farmers, in some instances with satisfactory results. As in other areas, lime is required.

The principal varieties growing are Malagache, M. 89, 87, 85, Clark's Seedling, Q. 903. Borers are attacking the Clark's Seedling in places although not extensively.

PROSERPINE.

The cane round Proserpine, taken collectively, looks well. Most of the crop is plant cane, there probably not being more than about 10 per cent. ratoons. The staple varieties are Badila, Clark's Seedling, N.G. 24, D. 1135, and Malagache. In the planting that is at present going on it is probable that Badila takes the foremost place. The characteristics of the latter cane are well known and generally speaking it is a very satisfactory variety for this area. Malagache is also a good grower, one farmer cutting as high as 60 tons to the acre.

More energy is being displayed generally here by the growers with regard to obtaining commodities for agriculture that contain lime. This is gratifying and essential. A movement is on foot to get a pulveriser placed at the lime quarry at Ben Lomond.

BOWEN.

Very little cane is being grown around Bowen. It is unlikely the farmers will collectively send more than 1,000 tons to the mill this season. Varieties growing are D. 1135, Badila, Green Goru, and Malagache. The majority of the farmers are merely making cane at present a by-product, finding it more profitable under present conditions to grow legumes, fruit, &c.

Bowen is an area that should be suitable for irrigation. Water is to be found at a shallow level and good for this purpose. There is not a great deal of nut grass, and the contour of the country lends itself to the construction of drains through which water would gravitate.

AYR.

In this district a good deal of planting is going on. Badila was planted in a fairly extensive manner in March and is making a fair show, with very few misses. This cane does well here and has an average density of about 14 per cent.

Other canes that are making a fair showing in the Ayr district are Q. 813, 1121, and 903. These three varieties are showing themselves to be heavy growers of high density and possessing good stand-over properties. Off a mixed plot containing these three canes one farmer cut from a little over half an acre 20 tons.

Just prior to good rains falling, about the third week in April, many of the growers were extensively irrigating, but during the last ten days over 3 inches of rain has fallen and greatly lessened the necessity for this.

The greatest courtesy was extended to me by everyone with whom I came in contact during my visit to the different centres.

The General Superintendent of the Bureau of Sugar Experiment Stations returned to Brisbane on Saturday, 17th May, from an extended visit to the North Queensland sugar districts. A report has already been made available concerning the crops and general appearance of the Mackay and Lower Burdekin districts. After leaving those areas Mr. Easterby proceeded to Mossman where he found conditions good, a very fair crop being anticipated. The cane looks well and very little disease is visible.

Some time ago 75 per cent. of the Mossman crop was the variety known as D. 1135, but this is now being largely discarded in favour of H.Q. 426 or Clark's Seedling, of which a large percentage is now being grown. Goru and Badila is also being grown to some extent. Two Mowbray Seedlings were giving excellent results, one like Badila carrying a heavy dark-green foliage looking particularly fine. The wet season this year was late in putting in an appearance but the cane is now growing vigorously. A good deal of planting is also being done for next year. A meeting of growers was held at Mossman at which an address on cane cultivation was delivered while Drs. Illingworth and Williams (a visiting Hawaiian entomologist) also gave interesting details on their particular lines of work. The meeting was largely attended and a great amount of interest displayed by growers. This area suffered severely some years ago from floods and cyclones, but the courage of the farmers surmounted all difficulties and the district is now flourishing again. At Cairns the cane at Hambledon and Mulgrave was somewhat backward for this time of year owing to the wet season not having set in at the usual time and dry weather prevailing through much of the growing period. The recent good rains, however, have given a considerable impetus to growth and produced a great change in the colour of the foliage, while the cane has also commenced to grow vigorously. The estimate for the two mills has now been materially increased. At Babinda the usual rainfall is so heavy that a smaller amount is of considerable benefit, and this has been the case this year and has produced a very fine crop, it being estimated

that this mill alone may deal with 160,000 tons of cane. Good progress is being made at Meringa by the Entomologist, Dr. Illingworth, and the experiment plots are looking well.

At Innisfail the crops were also good, and presented a marked contrast to the cyclone-smitten cane of last season. The outlook is at present very promising. Constant rains had been falling since the end of March, which was having a fine effect on the cane generally. Grubs have done considerable damage in many parts of the South Johnstone area. On Mr. Sugden's plantation the varieties known as Badila Seedling and Hybrid No. 1 were found to be doing remarkably well. The buildings upon the new experiment station at South Johnstone have now been completed and are substantial and serviceable. The work of breaking up has been commenced and it is hoped to commence planting in August.

MOLASSES FERTILISER.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report on the application of molasses to sugar-cane from the field assistant, Mr. J. C. Murray:—

With reference to the use of molasses by Mr. W. Jackson, of North Eton, this farmer has five varieties growing that have been treated with this product. The following is a list of the canes and how treated:—

Badila.—In preparing the ground for this variety, four ploughings were given, and the land treated with filter-press cake and molasses to the extent of 3,000 gallons per acre broadcast. After the first ratoon was cut the stools were treated with molasses by running along a dray with a tank on it and letting the molasses pour over the stools. The treatment made a great difference in the cane. In no case was the fertiliser (molasses) placed on land that had an acid reaction. Incidentally no harm is done to the earthworm by this treatment. Some stools of the Badila that happened to miss the molasses were a long way behind the others as regards growth, colour, and general appearance. This variety on Mr. Jackson's farm looks better than any other Badila in the Mackay district.

D. 1135.—This variety was treated in the same manner as the Badila, but it is on a piece of land that is badly drained and inclined to acidity. No improvement noticeable.

Q. 855.—This variety has been treated in the same manner as the Badila. Mr. Jackson claims a great advance in tonnage and a heavier density since using molasses. The cane looks very healthy and strong.

H.Q. 458.—This variety has been treated in the same manner as the others and looks healthy and vigorous.

Q. 813.—This is a first ratoon crop and will probably cut 30 tons to the acre. The land was treated in the same manner as the Badila.

As regards the D. 1135 the land showed an alkaline reaction when first treated with molasses in 1916, but it has since developed a slight acidity. Probably it should have had a heavier treatment or filter press at the offset.

NOTES ON SISAL AND HENEQUEN.

In the Journal of the Jamaica Agricultural Society (February, 1919) a very useful article appeared on the subject of the cultivation of Sisal and Henequen (Fourcroya). Although this industry has practically died out in Queensland during the past ten years, previous to which time the plant was successfully grown, and when a good profit was made by planters who had installed the necessary machinery, it is yet a crop which, thriving as it does on land unsuitable for any other agricultural product, offers a good return for the fibre. About the year 1909, sisal hemp grown at Childers, at St. Helena, and in other localities, and sold at £24 per ton, yielded a profit of 50 per cent. on the cost of production. During the war the price of Sisal hemp rose to over £100 per ton, and doubtless there would have been many plantations established had it not been for the want of shipping facilities. Full instructions for the cultivation of the Sisal plant (*Agave sisalana*), as well as for the extraction of the fibre, were given in a pamphlet issued by the Department of Agriculture and Stock, which, however, is now out of print.

Botany.

LUMINOUS FUNGI.

By C. T. WHITE, Government Botanist.

The unusual wet weather experienced during May and the early part of June was especially favourable to the growth of numerous forms of the higher fungi, among the most interesting of which are those possessing the property of phosphorescence or luminosity. A large specimen of one of these was brought in to me by Mr. Eric McCorkell, who stated that he had gathered the specimens at the base of a stump between Kingston and Loganlea, and a week or two later Mr. E. W. Bick found specimens of the same thing growing at the base of a damp bushhouse wall in the Brisbane Botanic Gardens.

Material was forwarded to Dr. J. B. Cleland, of Sydney, for identification, and he replied: "I think the luminous agaric is an example of the common pleomorphic phosphorescent Pleurotus. This is probably best called *Pleurotus lampas*, Berk., and synonyms appear to be *P. phosphoreus, P. illuminans*, and *P. candescens.*"

Several of the Agaricaceæ (mushroom family) are luminous, and, according to Dr. M. C. Cooke ("Introduction to the Study of Fungi," p. 89), the majority are Australian.

An interesting account of the species here illustrated, and on luminous fungi in general, is given by D. McAlpine in the "Proceedings of the Linnean Society of New South Wales," vol. xxv. In it he says: "Luminosity is a better term for the phenomenon than phosphorescence, since it is not in the nature of true phosphorescence. The luminous fungi glow without previous exposure to the sun, and the property cannot be excited by mere heat, as in the case of certain mineral substances such as phosphorite. Further, it is not due to the formation of some readily oxidizable compound of phosphorus, such as phosphuretted hydrogen in the organism, as has been shown by Pfluger. It is essentially a vital phenomenon, disappearing immediately on death, and probably the energy set free in the process of destructive metabolism is evolved in the form of light."

Other species of luminous fungi found in Queensland are *Panus incandescens*, Berk. and Br., *Panus conchatus*, Fries, and *Hiatula Wynniæ*, Berk. and Br. The light varies considerably with the species. In the larger ones—*Pleurotus lampas* and *Panus incandescens*—it is quite strong enough to enable one to see the time indicated by the hands on the face of a watch. *Panus conchatus* is a smaller species (2 to 4 in. in diameter), and, like the previous two, shows a white light. *Hiatula Wynniæ* is a small species of a more regular mushroom appearance consisting of a cap about 1 in. in diameter on a slender stalk of about 1 in., and shows in the dark a green light.

An excellent coloured illustration of the very common New South Wales luminous fungus, *Pleurotus nidiformis* (with which Dr. Cleland thinks our plant is probably identical), is given by Cleland and Cheel in the "Agricultural Gazette" of New South Wales for March, 1916, where they refer to it particularly as a timber-destroying species.

PLATE 3.—PLEUROTUS LAMPAS, A LUMINOUS FUNGUS.
The measurement at the base is in inches and quarters of an inch.

Entomology.

CANE GRUB INVESTIGATION.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report upon Cane Grub Investigation, May, 1919, from the Entomologist, Dr. J. F. Illingworth:—

The continued rains have wonderfully improved the appearance of the cane in the infested areas. Fortunately, there has been no heavy wind, and in most cases the cane is still standing; even where the leaves became dry and brown new growth has started. Digging revealed new roots beginning to shoot out; apparently the grubs reached their zenith about the middle of April in this district, and they have now (10th May) almost all gone down.

MOSSMAN DISTRICT.

During the month I made a careful survey of the grub situation in the Mossman district—a region which had been of special interest to me because of the remarkable way that the grub-pest disappeared there. In former reports I have noted my observations on the emergence of the cane-beetles, which were rather numerous last December; hence, I was agreeably surprised to find that there is little evident injury from grubs this season at Mossman.

I can only assign this immunity to two important factors—late cultivation and the use of ammonium sulphate. This chemical is used rather generally throughout the district. The season, too, has been particularly favourable for late cultivation, and I found absolutely no injury to the late-planted cane. The only places where the grubs got in their work at all were in the ratoons and early-plant crops, which had been laid by before the beetles flew. An interesting example of this was on the farm of Crees Brothers. A field of 13½ acres of Badila was planted in June, 1918, on rich sandy-loam soil. Only about half of it was cultivated during the flight of the beetles in December; the other half was not worked, at that time, because of the difficulty in getting through it. The crop is most remarkable, for the portion that did not get the final cultivation has suffered considerably from the grubs, while the worked half is uninjured. The land was fallow for twelve months before planting because a crop had failed to strike. At the time of my visit, the late-cultivated portion was a beautiful dark green, with stalks of 5 or 6 ft. in length. Mr. Crees informed me that no manure was applied. One could not find a better example of the value of cultivation in the control of grubs.

The late-planted Badila in an adjoining block, on this farm, gave no indications of grubs. It is about 10 ft. high and could not look finer. About a bag of ammonia was used to the acre, after the rains began, and cultivation was continued right through the flight of the beetles.

This farm formerly belonged to Mr. F. W. Barnard, who used to have serious losses from grubs in the early days. He became an advocate of the use of carbon bisulphide; and I found that he recognised the value of late cultivation. He wrote: "Farmers in this district, on land subject to grubs, have found that by planting not earlier than September, the cane is young and growing vigorously at the time the grubs are about. The plant is then continually throwing out fresh rootlets, which enables it to withstand, to a certain extent, the onslaught of the pest. Also at the time the beetles lay their eggs cultivators are being freely used, which destroy large numbers of them." (*Vide* "The Australian Sugar Journal," vol. 1, p. 481.)

As is well known in the district, Mango Park, the estate of the late J. D. Johnson, was once a centre of infestation. Mr. Johnson tried every suggested remedy, and finally the worst fields were thrown out of cultivation. Hence I am particularly interested in this estate, for it is no longer a grubby centre. The infestation is very slight this season, and only appears in one small field of ratoons, which received no ammonia and only slight cultivation, which was finished before the beetles flew.

The crop throughout the estate is most promising this season; the foliage is a beautiful dark-green, and since the recent rains the growth has been most satisfactory. Only 123 acres are under cane at present, but a much larger area could be worked if facilities were available. The present crop could be well doubled by increased planting and more intensive cultivation.

D. 1135 has been the principal crop on this estate, and at present 77 acres of ratoons are of this variety. This cane is very resistant to drought, and since most of the ratoons had a dressing of ammonia during January the boost is most remarkable. The application of this manure was followed by gentle rains and the cane got the full benefit.

The 46 acres of plant cane was all put in late (August to November), and it is interesting to note that it has no sign of grubs, for it is on the part of the farm that used to be always affected. A part of this is on land which has been out of cultivation for seven years, because it was considered too grubby for profitable working.

Most of the plant cane has had a dressing of about 4 cwt. meatworks manure per acre, and it has made a splendid growth, especially H.Q. 426 (Clark's Seedling), which seems especially suited to that class of soil. It is double the size of the Badila, Goru, and D. 1135 planted at the same time, and covers the ground so that it has no weeds, which are abundant in the latter variety, because of its upright sparse growth.

Present observations would indicate that it is possible to grow bumper crops on even the worst infested locations by giving care to cultural methods alone.

Infested portions must be put in late, so that the cultivation coincides with the flight of the beetles, particular care being given to forcing this during the first three weeks after their appearance. Manure, also, has an important bearing, especially the nitrates, if applied at the time the cane is beginning to suffer from grubs. It gives it increased vigour and forces new roots to replace those that are eaten off.

Mr. W. P. Jones called my attention to one of his fields which demonstrates the value of intensive cultivation. He had the ground ploughed eight times previous to planting in October. This cane is now a very dense stand on the scrub land, and is about 10 ft. high. It has only had about ½ bag of ammonia per acre, but the colour is excellent. Though this land was grubby in former years, there is now no sign of injury; and there is every indication of a 50-ton crop. One can see why Mr. Jones believes in thorough cultivation and the use of nitrate for cane. It was on this estate (the late R. O. Jones) that such severe injury used to result from the grubs. The only place that they showed at all this season, was along a ridge in a field of fourth ratoons, a part of the field which had no ammonia, but the injury was of no consequence, for the cane picked up again after the grubs ceased work, about the middle of April.

There is a very interesting experiment in growing cane on the black forest land at Saltwater, on the farm owned by Mr. C. A. S. Andrews. This part of the farm has a most peculiar soil—as loose and friable as a garden, and one would naturally conclude that it would produce excellent crops. Experiments with early planting, however, have invariably come on well until the cane is about waist-high, when it quickly succumbs as if the soil was too poor or dry. To investigate this matter, last season, I dug under dead stools in this class of soil and found that *Lepidiota frenchi* grubs were abundant—enough to account for the failure. Hence, I was especially interested to find that Mr. Andrews was having success with late planting. He used both Clark's Seedling and D. 1135, and the cane has made most satisfactory growth in spite of the severe set-back that it got by the drought.

This land has been treated with 5¼ cwt. meatworks manure and 1½ cwt. sulphate of ammonia per acre. This black soil is easy to work for it is free from weeds; no chipping was required, and the scarifier was used only twice; still it is very clean, and the cane is covering the ground.

The late planting in the present case has enabled the crop to escape the grubs, and it is now too late for them to injure it. By cutting in October or November, it may be possible to ratoon the field so as to avoid them again, if the horse-work is continued through December. Moreover, this pest, which has a two-year life cycle, probably will not continue after this first lot gets out of the way. The *frenchi* beetles appear to prefer blady grass, and as this is abundant on every side, they may stay out of the ploughed land.

I was interested, too, in the disappearance of the cane rats at Mossman. I could hardly find a trace of them on this trip. The mill made no small outlay in laying poison baits at the end of crushing last season. These were prepared with split canes and arsenic, and scattered in all the rat-infested localities. Results were soon evident, for dead rats were found, and there was a strong odour of carrion along several of the watercourses. At any rate, the rats are not showing up this season; and the prospects are very encouraging.

Importance of Nectar-Producing Plants in Cane Areas.

The observation of our native parasitic wasps (*Campsomeris* sp.) feeding on flowers of various plants along the Mulgrave River suggested that it would be wise to have more honey-bearing plants on the waste ground near grub-infested cane areas, so that the wasps would be attracted to these localities, and eventually turn their attention to the grubs.

It is well known that the adults of these parasites subsist upon sweet secretions, which they secure largely from flowers, when they are to be had; they also feed upon honey-dew, and, in breeding them in captivity, we found that they take any form of liquid sweet that is offered them.

As far back as 1901 Mr. J. C. Clarke ("Agricultural Gazette," N.S.W., 1902, p. 1-6) of the Hambledon Sugar Mill, Cairns, called attention to the importance of planting Congo or pigeon pea (*Cajanus indicus*) around each field, and the growing of the Bona Vista bean (*Dolichos lablab*) as a crop for green manure so as to encourage the multiplication of parasitic insects which feed on the nectar. He observes that the parasitic wasps were abundant at the flowers; and at the time of harvesting the cane close by in the same field, he discovered many of the larvæ of these parasites in the soil, where they were destroying the cane grubs.

In Mauritius, too, the interesting observation was made that *Tiphia parallela*, which was introduced from Barbados, only reproduced successfully in localities where nectar-bearing flowers were present. In its native home, this species never was known to visit flowers, for it fed upon the honey-dew from aphids. In Mauritius, however, plant lice are so well controlled by natural enemies that the wasps were compelled to turn their attention to flowers for existence.

These observations would suggest that our own native parasites of the white grubs might be considerably assisted and encouraged if we provided them with suitable nectar-bearing flowers in the vicinity of the infested cane areas. Naturally these wasps in their quest for food are led far into the wild country, and since they can easily find their natural prey, white grubs, there under the grasses, they seldom return to the cane areas to oviposit.

The abundant flowers of the pigeon pea are particularly attractive to hymenopterous insects. Furthermore, this plant is of recognised value for green manure (see illustration, "Agricultural Sugar Journal," vol. I., p. 21) a fact which was demonstrated by the experiments of the Colonial Sugar Refining Company years ago. They found that it was even better than the black Mauritius bean, especially for the long fallow during the dry months, for its dense foliage prevented the growth of grasses.

I secured a few seed from Senator Crawford, who has a fine lot of these bushes growing in his yard, at Mossman. I shall try some experiments as to their attractive value for the wasps, by planting them along the headlands of our infested fields.

GREENHILLS ESTATE.

The immune area, which one sees upon entering the estate, is in excellent condition, both as to growth and colour. The late rains have done much to retrieve the bad effects of the drought.

Even the infested portion of the estate is considerably improved over what it was a month ago. Little of the injured cane has fallen, so, if the rains continue, much of it will form new roots and revive, now that the grubs have about completed their feeding.

It is interesting to note, again, the good appearance of the cane at the edge of the fields, bordering the feeding-trees to windward. In some cases this shows no sign of infestation; the beetles apparently flying for some distance, often several chains, before alighting to oviposit.

The October plant-cane of field J1 is still dark-green, in marked contrast to the brown fields on every side. There are only a few spots which have shown any grub injury, and these are rapidly improving. J4, just across the tramline, planted in August, is a wreck. It had a lot of cultivation, but none at the vital time—during the early part of December, when the beetles were beginning to oviposit.

It is also very satisfactory to be able to report the splendid condition of the first ratoons in the west half of L6. The slight indication of grubs, noticeable a month ago, along the tramline, has entirely disappeared, and the cane is in perfect condition. It will give a second good cut about November, and will probably ratoon again successfully during December.

It will be unfortunate for our investigations if this estate is thrown out of cultivation, as is now considered probable, since the loss caused by the grubs is so tremendous. One could not wish for a better growing soil, if the grubs would let the cane alone. It is exceedingly friable and fertile, producing satisfactory crops, even without manures. In spite of the fact, however, that I am more and more confident of success with this type of land, I can hardly expect the present lessees to go on paying out money, since they have already expended more than £26,000 above receipts, on the chance that the estate would again produce a 30,000-ton crop.

General Notes.

SOCIETIES, SHOW DATES, ETC., 1919.

KILCOY.—Kilcoy Pastoral, Agricultural, and Industrial Society. Show dates: 17th and 18th July.

NORTHGATE.—Toombul Agricultural, Horticultural, and Industrial Association. (Secretary, Percy C. Sapsford.) Show dates: 6th and 7th September.

WOLVI (*via* Gympie).—Wolvi Farmers' Progress Association. Secretary, W. F. P. Asher.

RECORD PRICE FOR TWEED RIVER BANANAS.

A correspondent of the "Daily Mail," 13th June, stated that the supply of bananas had somewhat fallen off owing to winter conditions, but abnormal prices in the Sydney market were still being obtained by Tweed growers. Recently one grower received the extraordinary price of 35s. per case. This time last year growers seemed pleased with a price varying from 11s. to 14s.

A NEW GARDEN PEST.

"Farm and Home" (Melbourne) states that, at Glenore, in Tasmania, a new garden pest has made its appearance. A small blue beetle, which hops just like a flea, has attacked the French beans, riddling the leaves just like the pear slug. They are also found in numbers on the common dock leaves. These seem to be the only two kinds of vegetation affected yet. The beetles breed at the roots of the *Acaena sanguisorba* (burr), where they also obtain their nourishment until they reach maturity, when they feed on crops. At times they do a great deal of damage to strawberries, and also attack fruit trees in a small way. They have no English name, but belong to one of the largest families of beetles in the world, which are vegetable-feeders. They are considered capable of becoming a pest in the orchard. A spraying of arsenate of lead is the best method of extermination.

"COMMONWEALTH JOURNAL OF SCIENCE AND INDUSTRY."

By the courtesy of the editor of the above journal, we are in receipt of the first number of volume 1, issued in May, 1919. This publication promises to prove of great value, as the official journal of the Commonwealth Institute of Science and Industry, as a medium for the expression of Australian scientific thought and aspiration. As stated in the "Foreword," one of the objects of the Institute is to co-ordinate scientific work carried out in the Commonwealth. As things stand to-day, scientific research work in Australia suffers severely from two desiderata. There is a paucity of trained men, and there is also a scarcity of the necessary apparatus. There are too few laboratories, and too few men to fill them. That being so, it is very essential that the best possible results should be obtained from the limited man-power and material available. The columns of "Science and Industry" are to be freely open to all scientific investigators, no matter whether they come directly under the aegis of the Institute or not. It will be an informative rather than a controversial medium. This first number of the journal, which will be published monthly, contains, amongst other interesting articles, one on the Prickly-pear Pest, another on the Artesian Water Problem, both of profound interest to the man on the land in Queensland. These are excellently illustrated.

SMOKING BACON AND HAMS.

SMOKING.

In addition to the preserving action of smoke, it imparts a relishable flavour which adds to the value of the bacon.

The process of smoking preserves flesh by coagulating the albumen near the surface and forming a protective covering or envelope.

It has been ascertained that in smoking bacon there is no loss of nutriment, and it is as digestible as fresh meat.

The smoke creates a distinct antiseptic or preservative action, apart from the dried albuminoid coating, by depositing on the surface from the smoke creosote, formaldehyde, and pyroligneous or crude acetic acid. These check the auction and growth of putrefactive organisms and their processes. They retard decomposition, as well as imparting a delicate and appetising flavour.

The smoke-house should be about 12 feet high, seeing the bacon must be hung from 6 to 10 feet from the floor.

The floor should be earthen, brick, or cement, with a depression in the centre, away from the walls, in order to avoid setting fire to the frames.

There should be no light, excepting that admitted from the door when open. Sunlight has a tendency to bleach the bacon and deprive it of its natural colour.

Whatever ventilation is provided—and some is needed—it should be under control. The aim is to surround the bacon with a dense atmosphere of smoke at a low temperature.

Many methods of creating a proper class of smoke are applicable. White pine, oak, cedar, or hardwood sawdust, with damp corncobs and a few green eucalyptus leaves will answer from which to kindle a fire with a good development of smoke without much heat; or sprinkle essence of smoke (pyroligneous acid or crude acetic acid) over the smouldering sawdust.

In case of direct heat reaching the bacon hanging over the fire, this can be avoided by having a sheet of galvanised iron placed a few feet over the fire, supported on loose bricks.

The smoke must be conveyed to the bacon as cool as it can be. To do this, care must be exercised in preventing direct heat reaching the bacon.

In deciding the length of time to apply smoke, judgment must be used. The desirable colour is a light-brown tan. To obtain this, smoking may occupy any period from thirty-six hours to five days.

The character of the flesh, its thickness, and other characteristics must be estimated in order to obtain perfection in determining the colour and flavour imparted by smoking.

Finish the sides now by dressing and rubbing the skin and flesh with pure olive oil.

Smoked bacon will hang well in the smoke-house until required, provided reasonable care be taken to exclude insects and keep the smoke-house dark, dry, and cool.

Any degree of dampness or moisture in the atmosphere in which the bacon hangs will end in mouldy bacon.

Where it is proposed to pack the bacon or ham in order to preserve it against attacks from insects or other troubles, the flesh is rolled in bran, oatmeal, shelled oats, or pea-meal, wrapped in newspapers, and stowed away on shelves or in boxes.

Every effort should be made to prevent blowflies and other pests getting access to the surface of the meat. They leave eggs on the flesh and in its numerous interstices; later on these give endless trouble. A simple means of checking their depredations is to sprinkle the surface of the meat with black pepper or a mixture containing this and cayenne pepper.

Another effective plan is to saturate calico, hessian, or clean bagging, in a creamy mixture of lime and water, and wrap the ham or bacon previously rolled in oat or peameal. Stitch the covering closely round the flesh.

MEASUREMENT OF FELLED TIMBER.

Mr. C. H. Annerley writes that he finds the rule given in the June issue of the Journal to be incorrect. The letter was submitted to Mr. A. Morry, Surveyor of the Department of Agriculture. He replies as follows:—

An error has certainly crept into Example No. 1, given on page 263 of the "Agricultural Journal" for June; but the correspondent is also in error through being unacquainted with the rules for measuring felled timber. The error in the Journal consists in stating the product shown in the example as 135 ft. *cubic*, when it should have been 135 ft. *super*. This is evidently an inadvertence, but it has easily caused a wrong calculation.

To ascertain the contents of felled timber, there are five systems of measurement known as:—

1. The "die square" method, which represents the cubic contents obtained by multiplying the length by the area of the inscribed square at the centre of the butt;
2. "Calliper" measurement, in which the area of the circumscribed square is the basis of calculation;
3. "True contents," for which the sectional area at the centre by the length are the factors;
4. "Board measurement," by which the contents are reckoned according to the number of superficial feet of one-inch boards which can be cut out of a log—allowance for bark, etc., being made;
5. "Quarter girth," in which the contents are taken as the product of the length and the square of one quarter of the circumference at the centre.

No. 3 is used on the continent of Europe; No. 4 in America; No. 5 in England; and Nos. 4 and 5 combined in Australia.

The vendor would naturally favour No. 3 method; but the purchaser would prefer No. 1, as he maintains he can only cut square timber out of this measurement. The quarter girth measurement, however, distributes the waste between vendor and purchaser, which is a fair and equitable measurement.

The rule is:—Take the square of the quarter girth in inches at the centre, which in this case is 81 in.; multiply it by the length in feet, which is 20; then divide by 144 in., when the cubic content in feet is obtained, which is 11¼; multiply this by 12 to reduce it to board measurement one inch thick, and the result is 135 superficial feet in the log.

The correspondent is in error in stating 12 in. to be the diameter of a circle which is 36 in. in circumference. The true diameter is slightly under 11½; hence his mistake.

ERRATUM.

In our note on "Perfection in Disinfectants" in the June issue of the "Journal," the "Poplar" Borough Council, in the East End of London, was, by an oversight, printed as the "popular" council.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR JUNE, 1919.

Article.		JUNE. Prices.
Bacon	lb.	11½d.
Barley	bush.	5s. 3d.
Bran (Warwick)	ton	£8 15s.
Broom Millet	„	£70 to £80
Broom Millet (Sydney price)	„	£65 to £75
Butter (First Grade)	cwt.	177s. 4d.
Chaff, Mixed	ton	£10 10s.
Chaff, Oaten	„	£10 to £11 10s.
Chaff, Lucerne	„	£10 to £15
Chaff, Wheaten	„	£6 10s. to £10
Cheese	lb.	11d.
Flour	ton	£14
Hams	lb.	1s. 3d. to 1s. 4d.
Hay, Lucerne	ton	£8 10s.
Hay, Oaten	„	...
Hay, Wheaten	„	...
Honey	lb.	5d. to 5¾d.
Maize	bush.	6s. to 9s. 6d.
Oats	„	4s. 7d.
Onions	ton	£20
Peanuts	lb.	5d. to 6d.
Pollard	ton	£9 5s.
Potatoes	„	£14 5s. to £20
Potatoes (Sweet)	cwt.	10s.
Pumpkins (Cattle)	ton	£1 12s. to £3 10s.
Eggs	doz.	2s. 1d. to 3s. 2d.
Fowls	per pair	3s. 6d. to 7s. 6d.
Ducks, English	„	3s. 6d. to 5s. 3d.
Ducks, Muscovy	„	5s 6d. to 8s. 3d.
Geese	„	8s. to 9s.
Turkeys (Hens)	„	10s. to 12s. 6d.
Turkeys (Gobblers)	„	14s. to 26s.
Wheat (Milling)	bush.	5s. 3d.

VEGETABLES—TURBOT STREET MARKETS.

Beans, per sugar-bag	6s. to 8s.
Beetroot, per dozen bundles	1s. 6d. to 2s.
Cabbages, per dozen	2s. to 8s.
Carrots, per dozen bunches	1s. 6d. to 2s.
Cauliflower	14s. to 19s.
Cucumbers, per dozen	1s. to 2s. 3d.
Lettuce, per dozen	1s. 6d. to 2s.
Marrows, per dozen	1s. to 1s. 6d.
Parsnips, per dozen bunches	...
Peas, per sugar-bag	10s. to 14s.
Potatoes (Sweet), per cwt.	4s. to 5s. 6d.
Pumpkins (table), per cwt.	3s. 3d. to 5s. 6d.
Tomatoes, per quarter-case	3s. to 12s.
Turnips, per dozen bunches	3s. to 4s.
Turnips (Swedes), per cwt.	3s. to 4s. 6d.

SOUTHERN FRUIT MARKETS.

Article.	JUNE. Prices.
Bananas (Queensland), per case ...	...
Bananas (Tweed River), per case	20s. to 35s.
Lemons, per bushel-case ...	11s. to 12s.
Mandarins (Queensland), per case	9s. to 10s.
Oranges (Queensland), per bushel-case	12s. to 14s.
Oranges (Navels)	10s. to 14s.
Passion Fruit, per bushel-case	12s. to 20s.
Pears, per bushel-case	5s. to 8s.
Pineapples (Queens), per double-case	9s. to 12s.
Pineapples (Ripleys), per double-case	8s. to 10s.
Pineapples (Common), per double-case	8s. to 10s.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Apples, Eating, per bushel-case	12s. to 15s.
Apples, Cooking, per bushel-case	11s. to 13s.
Bananas (Cavendish), per dozen	4d. to 9½d.
Bananas (Sugar), per dozen	5d. to 8½d.
Cape Gooseberries, per lb.	6d.
Citrons, per cwt.	10s.
Cocoanuts, per sack	15s. to 25s.
Custard Apples, per quarter-case	4s. 6d. to 8s.
Lemons (Lisbon), per quarter-case	15s. to 20s.
Lemons (Rough), per case	5s. to 9s.
Mandarins, per case	10s. to 16s.
Oranges, per case	8s. to 14s.
Oranges (Seville), per cwt.	14s. to 18s.
Oranges (Navel), per case	12s. 6d. to 16s.
Papaw Apples, per case	2s. 6d. to 4s.
Passion Fruit, per half-bushel case	9s. to 11s.
Peanuts, per lb.	5d. to 6d.
Pears, per case	10s. to 13s.
Pineapples (Rough), per dozen	6d. to 2s. 6d.
Pineapples (Smooth), per dozen	2s. to 5s.
Pineapples (Ripley), per dozen	3s. 6d. to 5s. 6d.
Rosellas, per quarter-case	4s. to 6s.
Tomatoes (prime), per quarter-case	7s. 6d. to 11s.
Tomatoes (inferior), per quarter-case	3s. to 5s.
Strawberries, per dozen boxes	12s. 6d. to 30s.

TOP PRICES, ENOGGERA YARDS, MAY, 1919.

Animal.	MAY. Prices.
Bullocks	£17 10s. to £20 17s. 6d.
Cows	£14 to £15 10s.
Cows (Single)	£18 12s. 6d.
Merino Wethers	37s.
Crossbred Wethers	44s. 3d.
Merino Ewes	29s. 3d.
Crossbred Ewes	37s. 6d.
Lambs	29s. 9d.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT BRISBANE.

1919.	MAY.		JUNE.		JULY.		AUGUST.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·13	5·17	6·30	5·0	6·39	5·3	6·30	5·18
2	6·14	5·16	6·30	5·0	6·39	5·3	6·30	5·18
3	6·14	5·15	6·31	5·0	6·39	5·4	6·29	5·19
4	6·15	5·14	6·31	5·0	6·39	5·4	6·28	5·19
5	6·15	5·13	6·32	5·0	6·39	5·5	6·28	5·20
6	6·16	5·13	6·32	5·0	6·39	5·5	6·27	5·21
7	6·16	5·12	6·33	5·0	6·39	5·5	6·26	5·21
8	6·17	5·11	6·33	5·0	6·39	5·6	6·26	5·22
9	6·17	5·11	6·34	5·0	6·39	5·6	6·25	5·22
10	6·18	5·10	6·34	4·59	6·39	5·7	6·24	5·23
11	6·19	5·9	6·34	4·59	6·39	5·7	6·23	5·23
12	6·19	5·9	6·35	4·59	6·39	5·8	6·23	5·24
13	6·20	5·8	6·35	4·59	6·38	5·8	6·22	5·24
14	6·20	5·8	6·36	4·59	6·38	5·9	6·21	5·25
15	6·21	5·7	6·36	5·0	6·38	5·9	6·20	5·25
16	6·21	5·6	6·36	5·0	6·38	5·10	6·19	5·26
17	6·22	5·6	6·37	5·0	6·37	5·10	6·18	5·26
18	6·23	5·5	6·37	5·0	6·37	5·11	6·17	5·27
19	6·23	5·5	6·37	5·0	6·37	5·11	6·16	5·27
20	6·24	5·4	6·37	5·0	6·36	5·12	6·15	5·28
21	6·24	5·4	6·38	5·0	6·36	5·12	6·15	5·28
22	6·25	5·3	6·38	5·0	6·36	5·13	6·14	5·29
23	6·25	5·3	6·38	5·1	6·35	5·13	6·13	5·29
24	6·26	5·3	6·38	5·1	6·35	5·14	6·12	5·30
25	6·26	5·2	6·39	5·1	6·34	5·14	6·11	5·30
26	6·27	5·2	6·39	5·1	6·34	5·15	6·10	5·31
27	6·27	5·2	6·39	5·2	6·33	5·15	6·9	5·31
28	6·28	5·1	6·39	5·2	6·33	5·16	6·8	5·32
29	6·28	5·1	6·39	5·2	6·32	5·16	6·7	5·32
30	6·29	5·1	6·39	5·3	6·32	5·17	6·6	5·33
31	6·29	5·0	...	...	6·31	5·17	6·5	5·33

PHASES OF THE MOON.

The Phases of the Moon commence at the times stated in Queensland, New South Wales, Victoria, and Tasmania.

		H.	M.	
7 May	☾ First Quarter	9	34	a.m.
15 „	○ Full Moon	11	2	a.m.
23 „	☽ Last Quarter	8	4	a.m.
29 „	● New Moon	11	12	p.m.

The Moon will be at its farthest distance from the earth on the 14th, and at its nearest on the 29th, when there will be a total eclipse of the Sun visible in Africa and S. America, but not in Australia.

5 June	☾ First Quarter	10	22	p.m.
14 „	○ Full Moon	2	28	a.m.
21 „	☽ Last Quarter	3	33	p.m.
28 „	● New Moon	6	53	a.m.

The Moon will be at its farthest distance from the earth on the 10th, and nearest on the 26th.

5 July	☾ First Quarter	1	17	p.m.
13 „	○ Full Moon	4	2	p.m.
20 „	☽ Last Quarter	9	3	p.m.
27 „	● New Moon	3	21	p.m.

The Moon will be farthest from the earth on the 8th, and nearest on the 24th.

4 Aug.	☾ First Quarter	6	12	a.m.
12 „	○ Full Moon	3	40	a.m.
19 „	☽ Last Quarter	1	56	a.m.
26 „	● New Moon	1	37	a.m.

The Moon will be farthest from the earth on the 5th, and nearest on the 18th.

For places west of Brisbane, but nearly on the same parallel of latitude—27½ degrees S.—add 4 minutes for each degree of longitude. For example, at Toowoomba the sun would rise and set about 4 minutes later than at Brisbane if its elevation (1,900 feet) did not counteract the difference in longitude. In this case the times of sunrise and sunset are nearly the same as those for Brisbane.

At St. George, Cunnamulla, Thargomindah, and Oontoo the times of sunrise and sunset will be about 18 m., 30 m., 38 m., and 49 minutes, respectively, later than at Brisbane at this time of the year.

At Roma the times of sunrise and sunset during May, June, and July, and to the middle of August may be roughly arrived at by adding 20 minutes to those given above for Brisbane.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

Orchard Notes for August.

The remarks that have appeared in these notes during the last few months respecting the handling and marketing of citrus fruits apply equally to the present month. The bulk of the fruit, with the exception of the latest ripening varieties in the latest districts, is now fully ripe, and should be marketed as soon as possible. so that the orchards can be got into thorough order for the spring growth. All heavy pruning should be completed previous to the rise in the sap; and where winter spraying is required, and has not yet been carried out, no time should be lost in giving the trunks, main branches, and inside of the trees generally a thorough dressing with the lime and sulphur wash.

Where there are inferior sorts of seedling citrus trees growing, it is advisable to head same hard back, leaving only the main trunk and four or five well-balanced main branches cut off at about 2 ft. from the trunk. When cut back, give a good dressing with the lime and sulphur wash. Trees so treated may either be grafted with good varieties towards the end of the month or early in September; or, if wished, they may be allowed to throw out a number of shoots, which should be thinned out to form a well-balanced head, and when large enough should be budded with the desired variety.

Grafting of young stock in nursery, not only citrus but most kinds of deciduous fruits, can be done this month. It comes in useful in the case of stocks that have missed in budding, but for good, clean grown stocks budding is to be preferred.

In the case of working our Seville orange stocks to sweet oranges, grafting is, however, preferable to budding, as the latter method of propagation is frequently a failure. The Seville stock should be cut off at or a little below the surface of the ground. If of small size, a single tongue graft will be sufficient; but if of large size, then the best method is the side graft—two or more grafts being placed in each stock, so as to be certain of one taking. In either case the grafts are tied firmly in place, and the soil should be brought round the graft as high as the top bud. If this is done, there will be few missed, and undesirable Seville stocks can be converted into sweet oranges.

In select wood for grafting, take that of the last season's growth that has good full buds and that is well matured; avoid extra strong or any poor growths.

Seville oranges make good stocks for lemons. In case it is desirable to work them on to lemons, it is not necessary to graft below ground, as in the case of the sweet orange, but the stock can be treated in the same manner as that recommended in the case of inferior oranges—viz., to head hard back, and bud on the young shoots.

Where orchards have not already been so treated, they should now be ploughed so as to break up the crust that has been formed on the surface during the gathering of the crop, and to bury all weeds and trash. When ploughed, do not let the soil remain in a rough, lumpy condition, but get it into a fine tilth, so that it is in a good condition to retain moisture for the trees' use during spring. This is a very important matter, as spring is our most trying time, and the failure to conserve moisture then means a failure in the fruit crop to a greater or less extent.

Where necessary, quickly acting manures can be applied now. In the case of orchards, they should be distributed broadcast over the land, and be harrowed or cultivated in; but in the case of pines they should be placed on each side of the row, and be worked well into the soil.

The marketing of pines, especially smooths, will occupy growers' attention, and where it is proposed to extend the plantations the ground should be got ready, so as to have it in the best possible condition for planting, as the thorough preparation of the land prior to planting pines is money very well spent.

The pruning of all grape vines should be completed, and new plantings can be made towards the end of the month. Obtain well-matured, healthy cuttings, and plant them in well and deeply worked land, leaving the top bud level with the surface of the ground, instead of leaving 6 or 7 in. of the cutting out of the ground to dry out, as is often done. You only want one strong shoot from your cutting, and from this one shoot you can make any shaped vine you want. Just as the buds of the vines begin to swell, but before they burst, all varieties that are subject to black spot should be dressed with the sulphuric acid solution—viz., three-quarters of a pint of commercial sulphuric acid to one gallon of water; or, if preferred, this mixture can be used instead—viz., dissolve 5 lb., of sulphate of iron (pure copperas) in one gallon of water, and when dissolved add to it half a pint of sulphuric acid.

THE TROPICAL COAST DISTRICTS.

Bananas should be increasing in quality and quantity during the month, and though, as a rule, the fruit fly is not very bad at this time of the year, still it is advisable to take every care to keep it in check. No over-ripe fruit should be allowed to lie about in the gardens, and every care should be taken to keep the pest in check when there are only a few to deal with, as, if this is done, it will reduce the numbers of the pest materially later on in the season. The spring crop of oranges and mandarins will be now ready for marketing in the Cardwell, Tully, Cairns, and Port Douglas districts. For shipping South see that the fruit is thoroughly sweated, as unless the moisture is got rid of out of the skins the fruit will not carry. Should the skins be very full of moisture, then it will be advisable to lay the fruit on boards or slabs in the sun to dry; or, if this is not possible, then the skin of the fruit should be artificially dried by placing same in a hot chamber, as the moisture that is in the skin of our Northern-grown citrus fruits must be got rid of before they will carry properly.

Papaws and granadillas should be shipped South, and the markets tested. If carefully packed in cases holding only one layer of fruit, and sent by cold storage, these fruits should reach their destination in good order. Cucumber and tomato shipments will be in full swing from Bowen. Take care to send nothing but the best fruit, and don't pack the tomatoes in too big cases, as tomatoes always sell on their appearance and quality.

THE SOUTHERN AND CENTRAL TABLELANDS.

All fruit-tree pruning should be finished during the month, and all trees should receive their winter spraying of the lime and sulphur wash.

All new planting should be completed, orchards should be ploughed and worked down fine, and everything got ready for spring.

In the warmer parts, grape pruning should be completed, and the vines should receive the winter dressing for black spot. In the Stanthorpe district grape pruning should be delayed as late as possible, so as to keep the vines back, as it is not early but late grapes that are wanted, and the later you can keep your vines back the better chance they have of escaping spring frosts.

Towards the end of the month inferior varieties of apples, pears, plums, &c., should be worked out with more desirable kinds, side, tongue, or cleft grafting being used. In the case of peaches, almonds, or nectarines, head back and work out by budding on the young growth.

Farm and Garden Notes for August.

This and the following two months are about the busiest periods of the year so far as work in the field is concerned; and the more activity now displayed in getting in the summer crops, the richer will be the reward at harvest time. Potatoes should be planted, taking care to select only good, sound seed that has sprouted. This will ensure an even crop. Yams, arrowroot, ginger, sisal hemp, cotton, and sugar-cane may now be planted. Sow maize for an early crop. If the seed of prolific varieties is regularly saved, in the end it will not be surprising to find from four to six cobs on each stalk. This has been the experience in America, where the selecting of seeds has been reduced to a fine art.

In choosing maize for seed, select the large, well-filled, flat grains. It has been shown that, by constantly selecting seed from prolific plants, as many as five and six cobs of maize can be produced on each stalk all over a field. A change of seed from another district is also beneficial. Sow pumpkins, either amongst the maize or separately, if you have the ground to spare. Swede turnips, clover, and lucerne may be sown, but they will have to contend with weeds, which will begin to vigorously assert themselves as the weather gets warmer; therefore, keep the hoe and cultivator constantly going in fine weather. Tobacco may be sown during this month. If vines are available, sweet potatoes may be planted towards the end of the month. In this case also it is advisable to avoid too frequent planting of cuttings from the old vines; and to obtain cuttings from other districts. If grasses have not yet been sown, there is still time to do so, if the work be taken in hand at once. Sugar-cane crushing will now be in full swing, and all frosted cane in the Southern district should be put through the rollers first. Plough out old canes, and get the land in order for replanting. Worn-out sugar lands in the Central and Northern districts, if not intended to be manured and replanted, will bear excellent crops of sisal hemp. Rice and coffee should already have been harvested in the North. The picking of Liberian coffee, however, only begins this month. Collect divi-divi pods. Orange-trees will be in blossom, and coffee-trees in bloom for the second time. As this is generally a dry month in the North, little can be done in the way of planting.

Kitchen Garden.—Nearly all spring and summer crops can now be planted. Here is a list of seeds and roots to be sown, which will keep the market gardeners busy for some time: Carrots, parsnips, turnip, beet, lettuce, endive, salsify, radish, rhubarb, asparagus, Jerusalem artichoke, French beans, runner beans of all kinds, peas, parsley, tomato, egg-plant, sea-kale, cucumber, melon, pumpkin, globe artichokes. Set out any cabbage plants and kohl-rabi that are ready. Towards the end of the month plant out tomatoes, melons, cucumbers, &c., which have been raised under cover. Support peas by sticks or wire-netting. Pinch off the tops of broad beans as they come into flower to make the beans set. Plough or dig up old cauliflower and cabbage beds, and let them lie in the rough for a month before replanting, so that the soil may get the benefit of the sun and air. Top dressing, where vegetables have been planted out, with fine stable manure has a most beneficial effect on their growth, as it furnishes a mulch as well as supplies of plant food.

Flower Garden.—All the roses should have been pruned some time ago, but do do not forget to look them over occasionally, and encourage them in the way they should go by rubbing off any shoots which tend to grow towards the centre. Where there is a fine young shoot growing in the right direction, cut off the old parent branch which it will replace. If this work is done gradually it will save a great deal of hacking and sawing when next pruning season arrives. Trim and repair the lawns. Plant out antirrhinums (snapdragon), pansies, hollyhocks, verbenas, petunias, &c. Sow zinnias, amaranthus, balsam, chrysanthemum, marigolds, cosmos, coxcombs, phloxes, sweet peas, lupins; and plant gladiolus, tuberoses, amaryllis, pancratium, ismene, crinums, belladonna, lily, and other bulbs. In the case of dahlias, however, it will be better to place them in some warm moist spot, where they will start gently and be ready to plant out in a month or two. It must be remembered that this is the driest of our months. During thirty-eight years the average number of rainy days in August was seven, and the mean average rainfall was 2.63 inches, and for September 2.07 inches, increasing gradually to a rainfall of 7.69 inches in February.